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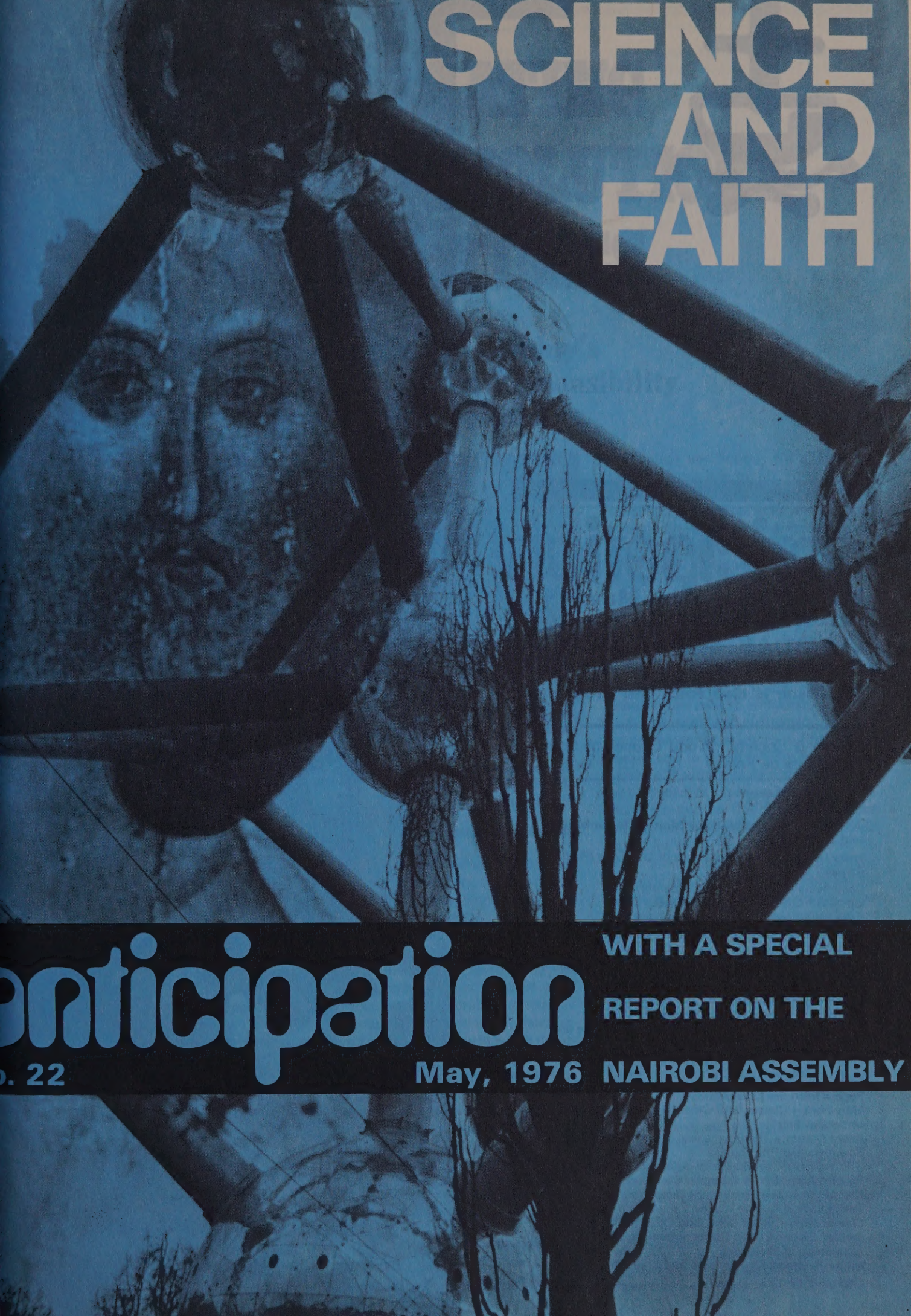

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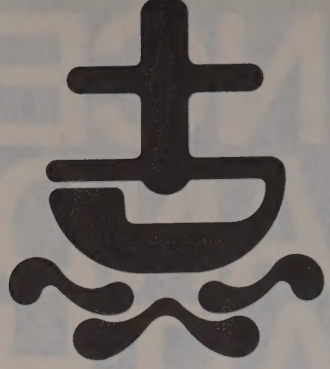
WITH A SPECIAL REPORT ON THE NAIROBI ASSEMBLY



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No. 22 **May, 1976**

CHRISTIAN SOCIAL THOUGHT IN A FUTURE PERSPECTIVE

This issue is also Faith and Order paper No. 77

Church & Society, World Council of Churches
150 Route de Ferney 1211 Geneva 20

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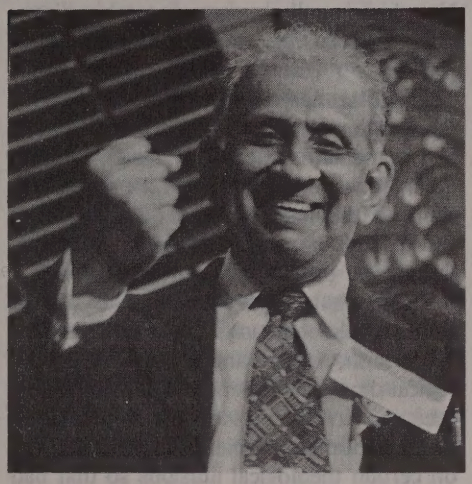
INTEGRATING THE TWO REVOLUTIONS OF OUR TIMES

The Nairobi Assembly's Discussion of Social Responsibility in a Technological Era

World Council of Churches' Assemblies take place only every seven years. While they are rather massive gatherings they are the best ecumenical indicator we have of how the representatives of the churches are moving in their thinking, and where they are willing for the World Council programme to go in the years ahead. This has been especially true in relation to ecumenical thought and action on social questions.

The first Assembly in Amsterdam (1948) is remembered for its work in untangling the economic and political issues underlying the struggle in the West between *laissez-faire* capitalism and totalitarian communism. These debates led to the idea of the Responsible Society as the Christian answer to the excesses of both dominant ideologies. The succeeding Assembly (Evanston, USA, 1954) expressed concern for the larger, worldwide dimensions of the contemporary social situation and encouraged the undertaking of the seven-year ecumenical study on 'Rapid Social Change in Africa, Asia and Latin America'. Assembly number three (New Delhi, 1961) pointed to the need for the churches to work on a large list of critical social issues in a world perspective. This resulted in the decision to hold a World Conference on Church and Society in 1966. Picking up on the conclusions of the 1966 meeting, the Fourth Assembly (Uppsala, Sweden, 1968) encouraged new and dynamic ecumenical action especially in the areas of development and racism. The Uppsala Assembly also hinted that the World Council might need to give more careful attention to the social and human consequences of 'world-wide technological change'.

The Assembly in Nairobi in December 1975, will be remembered as the occasion when the problems of science and technology, and their impact on humanity and society, appeared prominently for the first time on an Assembly's agenda; the result has been to alter radically our Christian understanding of the goals of modern society.



Dr. M.M. Thomas, moderator of the Assembly, urged a "Spirituality for Combat" in his report to the Assembly. Dr. Thomas was chairman of the Department on Church and Society from 1962 to 1968.

As emphasized by Dr Philip Potter in his General Secretary's report, the question of the future of humanity and society in a world of science-based technology developed between Uppsala and Nairobi as one of the major issues facing the world. The concern for the environment, for food and population, for limits to growth, raised questions about the use and misuse of technology, about the exhaustion of finite resources, and about the way in which the affluent industrialized countries were consuming a disproportionate share of the earth's resources.

At Nairobi this technological challenge to Christian theological and social thought was presented in a memorable address by Prof. Charles Birch, Head of the School of Biological Sciences of the University of Sydney, Australia, and for the last five years vice-chairman of the WCC inquiry on Science, Technology and Society. His address followed a strong plea by Mr. Norman Manley, the Prime Minister of Jamaica, urging the churches to engage more actively in the struggle for liberation from capitalism, colonialism, imperialism, and indeed from all new and old forms of domination and oppression.

In addition, Assembly Section VI on Human Development included a sub-section on Social Responsibility in a Technological Era. The report of that sub-section, as well as the report of the Assembly Hearing on the work of the WCC in this field are published in this issue of *Anticipation*.

A provisional and preliminary reflection on the Assembly reactions to Prof. Birch's speech and to the Assembly reports, suggest two important issues which are likely to be prominent in future ecumenical social reflection and action: (1) The relation between the two revolutions – one created by the demand for social justice and liberation; the other produced by the dynamics of rapid scientific and technological change and the increasing social uncertainty and confusion to which it leads; (2) the new theological and ethical dimension of the human problem revealed by the uncertainty about the right use of modern science and technology.

Relating the Social and Technical Revolutions

What is the right way to view the relation between the technical and the social revolutions of our time? Do they reinforce each other, or are they, as some would have it, competing concerns?

In the past, science and technology were often viewed as essentially neutral. The problems they created were seen as essentially social problems, to be corrected by their right use. To raise the 'technological issue' per se was in fact to distract attention from

* (Prof. Birch's address is printed in full in the January 1976 issue of *The Ecumenical Review* and offprints are available. In addition we reproduce some excerpts in this issue of *Anticipation.*)

the causes of social problems to their symptoms. Today we are less certain. It appears to many that science and technology themselves are the root of the difficulty, that modern technology has its own spiritual and ideological dynamic; and that it is nearly always assumed that more technology is always, or nearly always, better. The major problem of all societies is how to cope with the corruptions resulting from this assumption. Hence for Theodore Roszak and others, the real enemy is 'the technocracy', which no particular social system or ideology, left or right, has succeeded in controlling. From this perspective it is the traditional debate about capitalism and socialism which is in danger of dealing with the symptoms rather than the realities of our age. The reality is a civilization with an unshakable commitment to the mistaken values of a scientific-technological culture ('the idolatrous worship of things'); it is this which has to be opposed.

Inevitably this debate has taken on larger world overtones as the countries of Africa, Asia and Latin America have argued that their problem was not too much technology but not enough or the wrong kind – and have accused the western world of using the technology and ecology debate as a smoke screen for maintaining their own technological superiority.

In his speech, Prof. Birch sought to meet this problem by insisting that both the social and the technical revolutions have their own dynamic. The Third World should see that a critical review of the use of technology would reinforce and not diminish the concern for social justice. In one passage of his Assembly address he said:

There is no chance of the poor countries developing adequately unless the rich countries reduce the huge proportion they contribute to the total impact (on resources and environment). This involves a programme of de-development of the rich world. The rich must live more simply that the poor may simply live... According to the criterion of justice any country would be over-developed whose standard of living was beyond the capacity of the world to generate for all its peoples. This is a revolutionary ethical concept.'

Thus in his argument for the Sustainable Society Prof. Birch both encouraged the poor to make claims on the rich in the name of justice, and also pointed to the limits of the total claims which world humanity could make on the earth and its resources. In the past both rich and poor have tended to assume that these claims need have no limit. This larger understanding of the 'rule of the game' for human survival was the new factor which marked off the debate in Nairobi from all previous Assembly discussions of social futures and social change.

The Rediscovery of the Theological Dimension

The second important insight which emerged was a recognition of the need to rethink the theological basis of our view of the future and the central importance of this theological exercise. The Assembly was, I think, fascinated that a layman like Charles Birch should emphasize the connection between faith, science and society. The theological dimension seemed to take on a new meaning. In Birch's view the fundamental problem of modern science is that it is based on certain theological illusions so that bad theology contributes to bad science. 'There is a connection between our image of nature and the way we manipulate it'. The correction of wrong uses of science and technology requires a new and clearer picture of human responsibility, one which raises ultimate issues of humanity's nature and destiny. From the perspective of Prof. Birch this essential theological issue has been largely neglected by the churches:

'Science has laid bare the amazing interdependence and physical unity of the world. But the churches have, for the most part, left hidden the spiritual unity that alone gives the physical its meaning. I cannot think on this personalistic and unitary image of the creation without a humbling sense that all creatures are fellow creatures and that human responsibility extends infinitely to the whole of creation'.

1. Alaire Aca Manning speaks freedom songs and the Lord's Prayer in sign language. – 2. Participants create freedom and unity dance. – 3. Guido Rocha's powerful crucifix expresses his torture in South American prisons. – 4. Robert McAfee Brown sets Assembly mood with keynote address on main theme. – 5. Anglican Dean D. Tutu, Johannesburg, and Ms. Betty Thompson, communicator from New York. – 6. Women played a bigger role than at any previous assembly. – 7. David Amram, renaissance man of music, helps participants make their own music on Assembly issues. – 8. "From the Shackles of Domination and Oppression" was the challenging address by Michael Manley, Prime Minister of Jamaica. 9. Dancers in the shadow of the Kenyatta Conference Center emphasize the contrasts of Africa today. – 10. Philip and Doreen Potter. The WCC General secretary called the churches to fuller participation in their Council and to "costly ecumenism." Mrs. Potter created much original assembly music.

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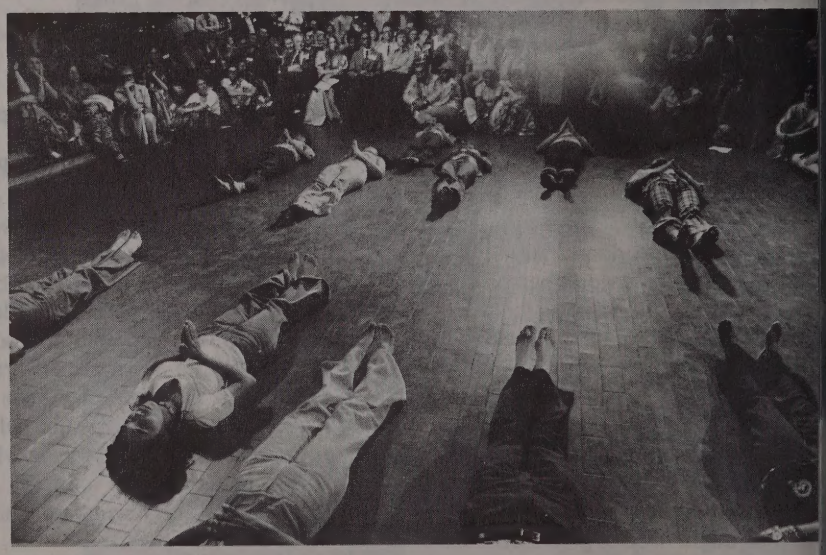

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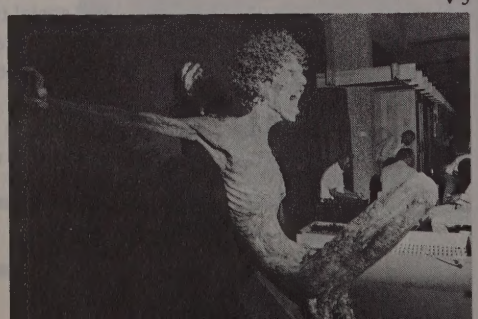

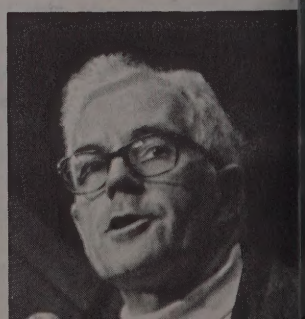

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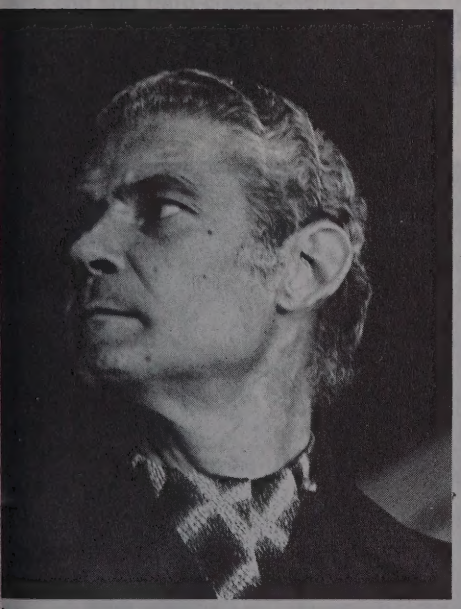

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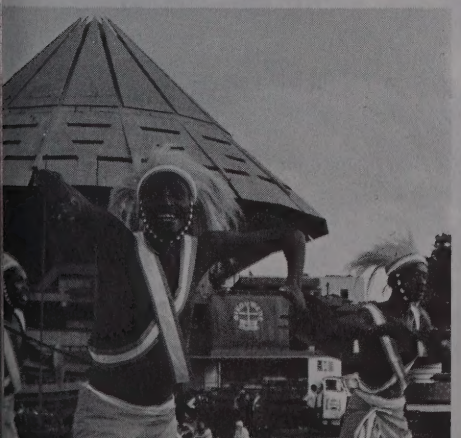

There were only a few scientists at Nairobi and most of the participants had only just begun to think about the issues posed. Nor did the Assembly have time to examine fully the report of the Consultation on 'Christian Faith and the Changing Face of Science and Technology', published in this issue of *Anticipation,* which illuminates the theological issues.

But the Assembly was agreed that the churches had to deepen their concern and quicken their action in relation to the challenges posed by modern science and technology. As the report of Section VI states: *'The responsibility that now confronts humanity is to make a deliberate transition to a sustainable global society in which science and technology will be mobilized to meet the basic physical and spiritual needs of people, to minimize human suffering and to create an environment which can sustain a decent quality of life for all people. This will involve a radical transformation of civilization, new technologies, new uses for technology and new global economic and political systems'.*

In the Assembly Hearing on the programme of the sub-unit on Church and Society, there is a strong recommendation that the continuity of the interdisciplinary ecumenical work on the issues of technology and the future of society be maintained. The Assembly also said:
'In contrast to the previous work, there is a clearly identified need to move towards a programme of action. The next ten years are of crucial importance as the world stands on the threshold of successive crises in population control, food and energy resources and the whole environmental problem, all demanding new concepts in physical, economic and social planning.'

Future Plans

The Assembly suggested a number of specific issues needing attention (see the attached Assembly documents). These must now be shaped into a programme of reflection and action for the period up to the next World Council Assembly expected to take place in 1982. The immediate short-run task is to follow-up the ongoing discussion of the *Report on Nuclear Energy* (Sigtuna 1975), the Bucharest Conference (1974) on *Science and Technology for Human Development* and the *Mexico City Consultation on Science and Faith*

The long-run Church and Society programme will begin to take shape in the course of the coming months with the first meeting of the new Working Committee in Geneva, May 15-20, 1976. Its proposals will be submitted to the Central Committee meeting in August, 1976 which must pass on all WCC programmes for the future.

Finances permitting, the plan is to continue the publication of *Anticipation* as a bulletin for communicating the results of the continuing ecumenical programme on Faith, Science and Society.

We cordially and urgently invite all interested persons to participate in and contribute to this common ecumenical effort and to share their insights. Only by bringing together the concerns of many different situations and the insights gained from different experiences shall the churches begin to fulfil the large responsibility which the Nairobi Assembly has laid upon them.

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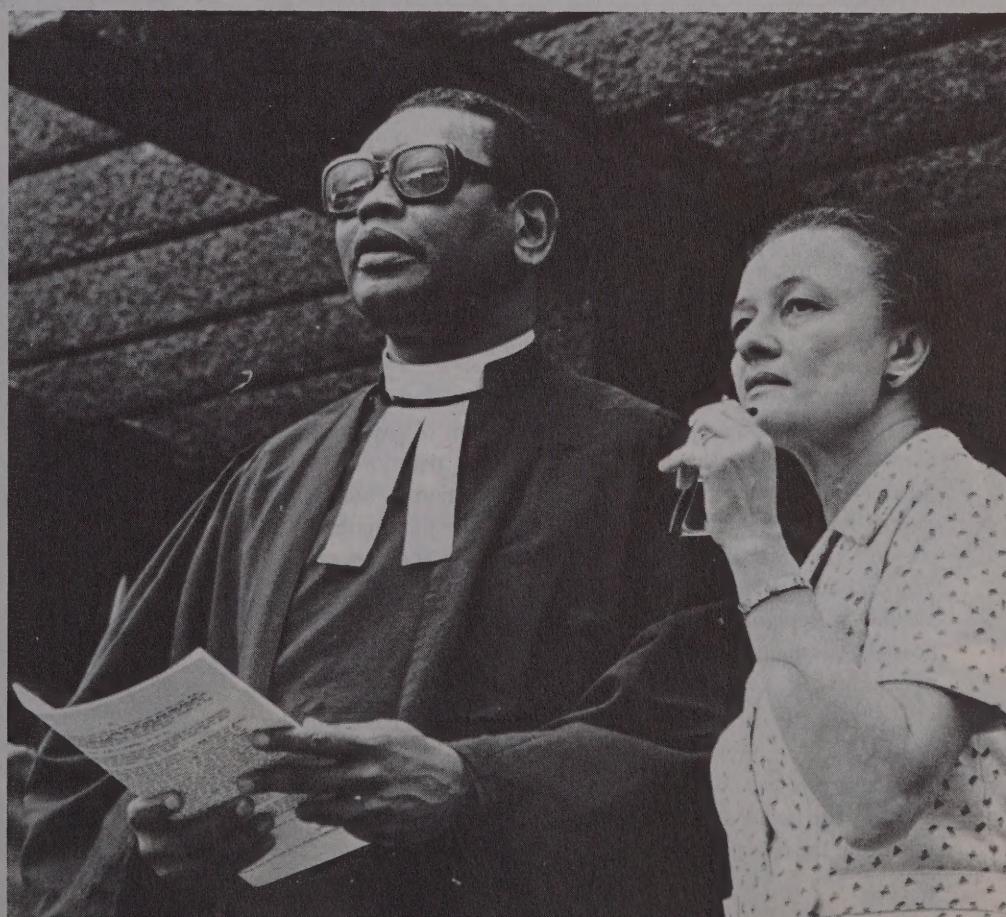


NAIROBI '75

CREATION TECHNOLOGY AND HUMAN SURVIVAL: CALLED TO REPLENISH THE EARTH

Extracts from the address by Prof. Charles Birch

The book of Genesis contains three directives in the 28th verse of the first chapter. The first is to 'be fruitful and multiply'. We have done that. The second is to 'have dominion over the fish of the sea, and over the fowl of the air, and over every living creature that moves upon the earth'. Science and technology are well on the way to completing that. The third directive is a plea to 'replenish the earth'. That we have failed to heed...

The total negative impact of all the people on earth is, in its simplest terms, a product of three items:

Total population x Consumption of resources per person x Environmental deterioration per person.

Every item of the impact equation is important. The more people the greater the impact, the more consumption of resources the greater the impact, the more environmental deterioration the greater the impact. Every item of the equation is increasing. Population will double in the next 35 years. Many components of consumption such as energy use have doubled about every ten years. Pollution has doubled in 14 years. The result is a huge and steadily multiplying impact of man on environment which cannot possibly continue without the gravest consequences to both humanity and the rest of the creation.

I know that I risk the displeasure of those who belong to the poor world by lumping the whole world into one impact equation. I am aware of the objections, especially of those who see this as a plot by the rich world to curb growth in the poor countries. I see it in quite the opposite way. There is no chance of the poor coun-

tries developing adequately unless the rich countries reduce the huge proportion they contribute to the total impact. This involves a programme of de-development of the rich world. The rich must live more simply that the poor may simply live.

Most people do not realize that society as it is now organized is not sustainable indefinitely. I do not simply mean that particular social structures will not survive. I mean that life itself is under threat, both the quality of life such as it is and sheer survival. The threat is also real that we could annihilate ourselves. Our minimal goals must be the removal of the threat to sheer survival and to the deterioration of the quality of life of the inhabitants of this earth, especially the poor. So a prior requirement of any global society is that it be so organized that the life of man and other living creatures on which his life depends can be sustained indefinitely within the limits of the earth. A second requirement is that it be sustained at a quality that makes possible fulfilment of human life for all people. A society so organized to achieve both these ends we can call a sustainable global society in contrast to the present unsustainable global society.

If the life of the world is to be sustained and renewed, as directed in Genesis, it will have to be with a new sort of science and technology governed by a new sort of economics and politics. That is what the sustainable global society is all about. It will not come without radical thinking and revolutionary transformations in science and technology and in economics and politics. The decisions we have to make are not just economic and political ones, they are also scientific and technical.

Interdependence: The nations of the world have not yet decided they want interdependence. The myth is still widely accepted that each nation is a separate lifeboat. There is only one lifeboat with all humanity on board, albeit with first-class passengers at one end and third-class passengers at the other. If one end goes down the whole boat sinks. Survival and distributive justice require a reallocation of resources on the lifeboat by some means that is more equable than the international marketing system allows. The ultimate challenge of resource reallocation is to the concept of ownership of resources by the nations that by accident happen to have them. We abuse resources because we regard them as commodities belonging to us. When we come to see land and minerals and oil and coal as part of a community to which we belong, we may begin to use them with a little more respect and at lot more justice.

'We are suffering', said E.F. Schumacher, 'from a metaphysical, not just a technical deficiency.' Total spiritual confusion prevails in the modern world about the relationship of man to nature in a technological culture. The churches and theologians, intimidated by secular culture, seem to have left the task of interpreting man's relationship to nature to mechanistic science (which is a misinterpreted science) and materialistic philosophy. Because the churches in the rich world are part of the technological culture they find it difficult to be critical of it. The result is implicit acceptance of the dominant world view with no clear and united voice to the contrary. Yet 'if the trumpet give an uncertain sound, who shall prepare himself for the battle?'

It is a cock-eyed view that regards ecological liberation as a distraction from the task of liberation of the poor. One cannot be done without the other. It is time to recognize that the liberation movement is finally one movement. It includes women's liberation, men's liberation, the liberation of science and technology, animal liberation, plant liberation and the liberation of the air and the oceans, the forests, deserts, mountains and valleys. As Joseph Sittler once put it: 'Christianly Lake Michigan is groaning in travail, waiting to be set free from its bondage of decay.'

Science has laid bare the amazing interdependence and physical unity of the world. But the churches have, for the most part, left hidden the spiritual unity that alone gives the physical its meaning. I cannot think on this personalistic and unitary image of the creation without a humbling sense that all creatures are fellow creatures and that human responsibility extends infinitely to the whole of creation.

SOCIAL RESPONSIBILITY IN A TECHNOLOGICAL AGE

Extracts from the Report of Section VI on "Human Development"

NAIROBI '75

1. Introduction

It is the considered view of many scientists and technologists that the world is on a catastrophic course leading to mass starvation, global depletion of resources and global environmental deterioration. The responsibility that now confronts humanity is to make a deliberate transition to a sustainable global society in which science and technology will be mobilized to meet the basic physical and spiritual needs of people to minimize human suffering and to create an environment which can sustain a decent quality of life for all people. This will involve a radical transformation of civilization, new technologies, new uses for technology and new global economic and political systems.

The new situation in which humanity now finds itself has been created in less than a generation. There is even less time to create the transition to a sustainable global society if humanity is to survive.

2. Technological Assessment and the Criteria for 'Appropriate Technology'

The world has reached the end of a triumphalist era in the use and deployment of science and technology. The time has come to exercise discriminating choice in favour of those technologies which conform to simplicity in design, are easily maintained, which reduce the overall impact on the environment and are compatible with indigenous materials and culture. The technology should also conform to ecologically sound 'development'. The human costs of technology have to be assessed as in many cases they appear to outstrip the apparent advantages. A movement towards a more diverse pattern of technological development must also be encouraged.

The Assessment of Risks. The increase in the scale of technology has introduced the possibility of a new order of catastrophe, e.g. the vulnerability of the 'green revolution' and of large centralized systems of production, such as chemical plants. There is need to examine the ethics of choice as between calculable risks in say coal mining and the possibility of a catrastrophe in nuclear power production. This demands a discipline and integrity of purpose that is unlikely to exist under conditions of social disorder. The introduction of any new technology may be challenged on these grounds alone. The principle should be established that the community must be given the opportunity to share in the planning of safeguards and the ultimate choice between technologies.

Energy Conservation. The immediate priority is to reduce the conspicuously high patterns of energy consumption in those countries which make the largest demands on the world petroleum market. This would extend the limited life of presently known recoverable reserves. Policies for energy saving include a shift to smaller cars and public transport, reduction of fuel used in food production and processing, better insulation of buildings, decentralized electricity generation, eliminating the use of electricity for space heating, reduced packaging and recycling of products.

Nuclear Energy. Increasing pressures on the world petroleum market bring the prospect of rapid expansion in the construction of nuclear power stations in countries at widely differing stages of development. This poses ethical dilemmas in view of (1) the inevitable coupling of nuclear energy for electricity generation and the production of nuclear weapons: how to limit the use of nuclear energy only for peaceful purpose of development, and avoid the possibility of using nuclear energy in nuclear weapons? (2) The Hazards involved in the storage of nuclear waste for long periods; and (3) the problems of theft and sabotage. The ecumenical discussion of these issues has just begun and needs to be continued. Discussion should concentrate on the effectiveness of the monitoring and control of the nuclear fuel cycle at the international level, ratification of the Non-Proliferation Treaty by all countries possessing nuclear technology, the drift towards a plutonium fuel economy and its consequences, and the political and military implications of the further spread of nuclear technology.

Alternative Energy Technologies. During the next decade, there will be increased reasearch and development on alternative systems of energy production. The world is now entering the transition between dependence upon petroleum to dependence upon other sources of energy, e.g. solar, wind, water and geo-thermal. Priority must be given to ensure that research on alternative energy sources is funded at a high level, especially as these technologies will be of direct benefit to developing countries.

Military Technology and the Use of Resources. A large proportion of the world's wealth and scientific and technical manpower goes into weapons and military technology. The Church must openly work against the increasing deployment of these resources to such destructive purposes and it must assist in making the full facts widely known.

Social Consequences of the Uses of Modern Technology of Human Communication. Modern technology makes increasingly possible the invasion of privacy by eavesdropping devices and computer banks of information. The control of radio, television and publication by relatively few people, has reduced the capacity of individuals to make responsible social judgements.

3. The Allocation of Common Resources not yet Claimed by Particular Nations

A possible way of driving a wedge between the present pattern of resource 'ownership' and the long-term demand for a more equitable distribution is to ensure that the regions currently beyond the control of national governments and transnational companies be protected for the future prospect of a fairer distribution of the oil and mineral resources they contain. There is urgent need to ensure that in yet another area resource exploitation is not handed directly to those countries possessing the necessary and available technology. A new taxation scheme on commercial and state enterprises in the 'international commons' such as the sea bed would help to channel revenues to developing countries on the basis of need. A clear ethic of control of natural resources will be required if such a taxation system is to be introduced.

4. Agricultural Technology and Food Crisis

The short-term issue is concerned with the establishment of an emergency food programme which could be utilized in the event of widespread crop failure or other types of natural disaster. The long-term issue involves the need to develop food technologies on a sufficiently large scale that are both ecologically sound and compatible with policies of self-reliant development. The changing pattern of agricultural development and food technologies in major food exporting areas of the world, such as North America, Australia and New Zealand will also need to be adjusted to meet the requirements of sustainable long-term production.

5. Ethical Problems in the Transition to a Sustainable and Just Society

Today new emphasis is being put on the goal of a sustainable society, where each individual can feel secure that quality of life will be maintained or improved. For the developed countries it means in the first instance a sustainable core of economic activity relating to patterns of indigenous resource consumption, for example, land use, food supply, and energy production, in a far longer time frame than suggested by trends in current commodity markets. It implies a substantial reallocation of power controlling the patterns of world trade in essential resources. It also implies increased participation by workers in the decision-making process in industry.

For the developing countries, it means emphasis on production for essential human needs, including food and energy; the search for the technologies which will guarantee this result and which will at the same time avoid a continuing dependence on technology imported from industrialized countries, which is in direct conflict with social and cultural identity.

There is a need to investigate ways of ameliorating the adverse effects of the impact on less industrialized nations of the stabilization of production and consumption of the industrialized world, and the effects on employment in the industrialized world. This will involve the search for alternative development strategies for less industrialized countries, new patterns of optimal international division of labour, the use of foreign capital and expertise, international control of such matters as pollution and resource rationing. The basic goal remains: nobody should increase their affluence until everybody has their essentials.

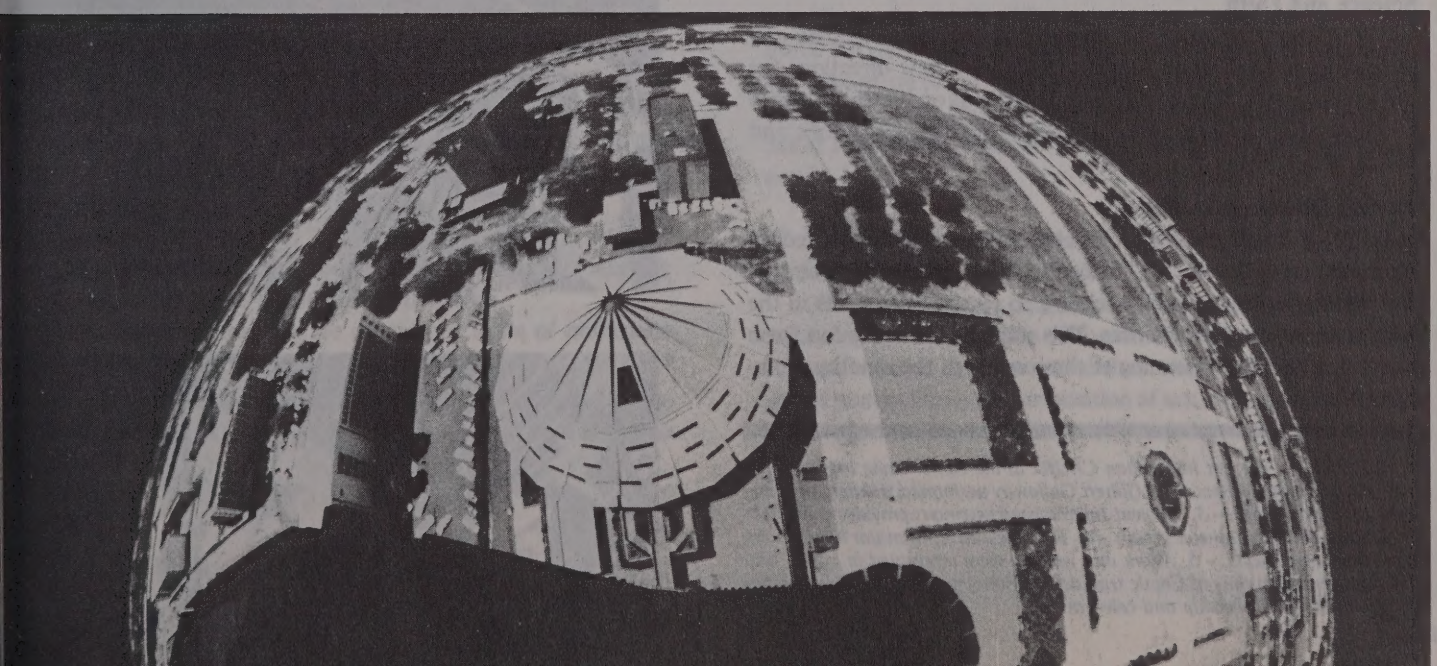
6. Ethical Dilemmas Arising from the Application of Modern Biology to Human Problems

Throughout Christian history the practice of abortion and the advocacy of contraception and euthanasia have posed ethical and theological dilemmas and remain controversial issues. Recent discoveries in the biological and medical sciences raise fresh ethical questions in uncharted areas. We accept that each individual life is infinitely precious in the sight of God, and the Christian responsibility is to preserve the sanctity of human life. This responsibility is challenged by the following developments and obliges the churches to reinterpret historic Christian teaching on the sanctity of human life.

a. Experimentation on human foetuses, including the transplantation of ova fertilized outside the body (prenatal adoption).
b. Artificial prolongation of human life in the comatose patient.
c. Recognition of biological death as a process, and its relationship to the practice of organ transplantation.
d. Possibility of controlling the sex of offspring.
e. Genetic engineering. This involves the future possibility of direct manipulation of human genes for the purpose of replacing deleterious genes by 'normal' genes. Present experimentation in genetic engineering is largely done on viruses and bacteria. They present the hazard of unintentional transformation of harmful viruses and bacteria into lethal ones. The churches should be involved in the risk-benefit analysing and in the problem of reducing risk in such experimentation. The possible application of genetic engineering to people raises the critical questions of experimentation on people.
f. Behavioural control. The use of drugs, electrical stimuli, psychosurgery and psychological methods of behaviour modification to control socially disapproved behaviour raises many unanswered ethical questions.
g. The misuse of studies on animal behaviour in interpreting human behaviour. These studies raise in a new context the question 'What is man?'.

7. The Encounter of Science and Faith

The encounter of science and faith takes place in two areas. One is in ethics. The application of scientific discoveries to human affairs raises ethical issues which science alone cannot resolve



since science itself does not prescribe the good.

The second area is the challenge of the Christian view of the creative activity of God in the world to the dominant scientific view of reductionism and materialism. The need is for a new working out of a common Christian conception of the creation which seeks to save the personal and which at the same time incorporates valid insights of modern science into the nature of the creation.

8. Conclusions and Recommendations to the Churches

Energy Conservation

It is recommended that the churches in the industrialized countries should challenge present patterns of energy consumption in order to extend the useful life of non-renewable energy resources and to assist the movement towards a low growth energy economy in those countries.

Nuclear Energy

As far as nuclear energy is concerned the churches at the national level should lobby for more effective safeguards in the control and operation of the nuclear fuel cycle to ensure that there is a reduced risk of diversion of strategic weapon materials; in addition there is a need to press for more serious investigation of the long-term disposal of radio-active wastes by those responsible for the management of nuclear power programmes. The churches are further urged to registrer their reactions to the findings of the Ecumenical Hearing on Nuclear Energy, Sigtuna, Sweden, 1975. (See 'Report on Nuclear Energy', *Anticipation no. 21 W.C.C., October 1975.)*

Alternative Energy Technologies

Since there are inevitable grave ethical problems involved in the application of nuclear energy, we recommend that the churches and individual Christian seek to promote sufficient funding and moral support for research and development of renewable sources of energy, e.g. solar and wave energy.

Ethical Obligations in the Sustainable and Just Society

We recommend that the churches should examine very carefully the implications of a movement towards a sustainable and just society as this embodies many significant structural changes in the patterns of food production, energy consumption, employment, population, housing and transport in both developed and developing countries.

Science and Faith

It is important that the churches encourage scientists and technologists to develop socially responsible new directions for modern societies. This encounter should focus on issues of science and faith and on the ethical implications of specific scientific and technical activities.

Ethical Dilemmas in Biology

We recommend to the churches and the Christian Medical Commission of the W.C.C. further study of the ethical dilemmas and theological perspectives relating to recent discoveries in the biological and medical sciences. This study should include a fresh consideration of the meaning of the concept of the sanctity of human life.

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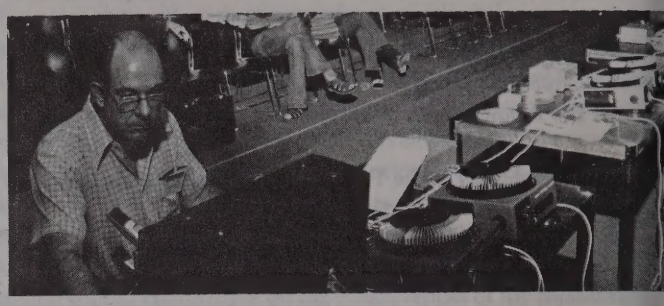

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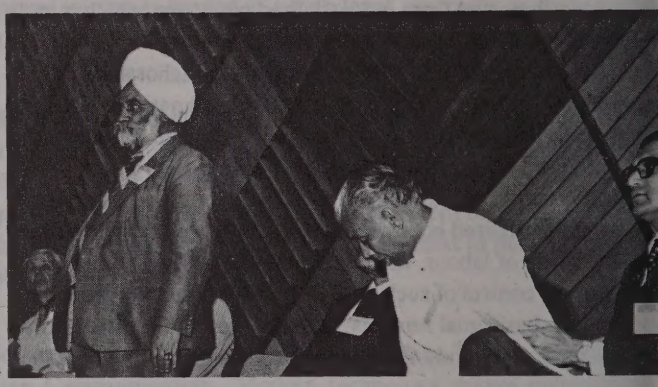

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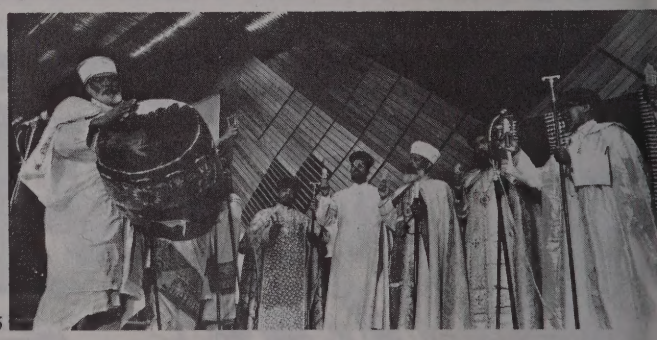

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1. CCA leaders present Indonesian Cricifix at the corner stone laying of the new AACC headquarters. – 2. Gilbert Galloway performed wonders with audio-visual technology. – 3. Ancient Japanese tea ceremony provides a way into meditation for international group. – 4. Representatives of major living faiths were honoured guests. – 5. Work and worship were integrated in a new way like this service in the old Coptic tradition of Ethiopia. – 6. All the assembly joined in the final worship and celebration.

REPORT OF THE ASSEMBLY HEARING ON THE PROGRAMME OF CHURCH AND SOCIETY

NAIROBI '75

I. Continuation of the Ecumenical Inquiry on the Technological Society

The Programme on the Future of Man and Society in a World of Science-Based Technology undertaken between 1969 and 1975 has brought together many people from different disciplines in the physical, biological, and social sciences, as well as theologians. In the view of the Hearing, the continuity of this work should be maintained.

In contrast to the previous work, there is a clearly identified need to move towards a programme of action. The next ten years are of crucial importance as the world stands on the threshold of successive crises in population control, food and energy resources and the whole environmental problem, all demanding new concepts in physical, economic and social planning. If the churches are to mobilize groups at a local congregational level, then it is essential to maintain and develop the continuity of this work. At the same time, the multi-disciplinary approach should include a stronger representation from politicians, industrialists and trade unionists and particularly representatives of these occupations from developing countries.

II. The Suggested Title for this Continuing Ecumenical Programme – 'The Contribution of Faith, Science and Technology in the Struggle for a Just and Sustainable Society'.

The new dimensions of this task have been identified by the Hearing Group.

A. Science and Faith and the Vision of a New Society

The encounter between Science and Faith is mutually challenging at the levels of both doctrine and ethics. The distinctive contribution of theology is to clarify the relationship between nature, science and humanity; and to weigh the sacramental view of nature under the claim of the God of the whole creation, and under the eschatological promise of delivrance.

B. Ethical Problems in the Transition to a Just and Sustainable Society

This topic calls especially for a more systematic understanding of ecological ethics and stewardship of resource use and distribution for the benefit of all humanity: it also calls for a change of life style in affluent societies which can only maintain their present patterns of consumption at the continuing expense of poor societies.

C. The Politics and Economics of Resource Scarcity and the Principles of More Equitable Distribution

The following Hearings are considered to be of immediate significance:

1. **Energy Resources** – Work on this topic should be considered as an extension of the Bucharest (1974) and Sigtuna (1975) Consultations which first raised the questions of energy planning in a Christian context and then explored future consequences of implementing the nuclear power option. There is need for consideration of national policies for energy conservation and alternative energy technologies based on 'renewable sources'.

2. **Allocation of Resources beyond the Control of National Governments.** Certain territorial regions e.g. the deep ocean bed, are currently beyond the control of national governments. There is currently a dispute over the width of the proposed 'economic zone' which would extend the limits of present national ocean boundaries. There is an urgent need to protect this resource potential while anticipating the future prospect of a fairer international distribution.

3. **Planning and Management of Large Urban Areas** as an ethical, technological and social concern.

4. **Multinational and State Corporations** – Discussion should be initiated between the W.C.C., Multinational and State Corporations, trade unions, and representatives of developing countries on the use and abuse of the technological and economic power exercised by these concerns.

D. Criteria for 'Appropriate Technology'

The time has come for society in developing and developed countries to exercise discrimination in the choice of technologies and to establish appropriate criteria including the assessment of risks. This should reflect the changing balance between production systems based on non-renewable in favour of those based on renewable resources.

E. Military Technology

The present expenditure of resources, both material and human to destructive ends, calls for a more deliberate and conscious effort on behalf of the W.C.C. and member churches to combat the arm race. (See reference to a proposed special consultation on Militarism.)

F. The Social Consequence of Modern Technology related to Information and Communication Systems

These can be identified as the invasion of privacy by electronic surveillance, centralized computer storage of information and the control of the mass media by relatively few vested interest in both the public and private sectors. This work might be carried out in cooperation with the W.C.C. Department of Communication.

G. Ethical Dilemmas Arising from the Application of Modern Biology to Human Problems

There is need to be concerned with the further biological and psychological manipulation of human life: e.g. experimentation on human foetuses; abortion and euthanasia; the artificial prolongation of human life; predetermination of sex in children; genetic engineering; the control of human behaviour.

"A Prophecy", by William Blake.
"When he sets a compass upon the face of the deep."

SCIENCE AND FAITH

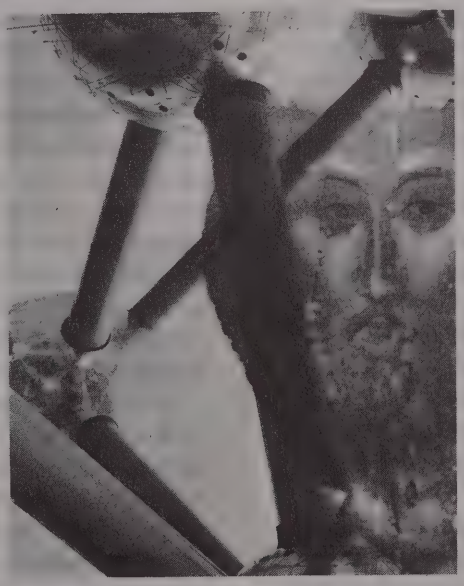
Report of a Consultation in Mexico City on the Christian Faith and the Changing Face of Science and Technology held in co-operation with the Commission on Faith and Order

At the conclusion of its study of the human future in a technological society the World Council of Churches' sub-unit on Church and Society was urged by many people, and particularly scientists, to explore directly the theological issues raised by the study. The plea was that work should go beyond the inevitable **ethical** questions about the use of science and technology and address questions of meaning, truth, and ultimate value in ways relevant ot the modern scientific mind. Meanwhile the Faith and Order Commission, long the classical locus of ecumenical theological studies, had been conceiving its task in a wider framework. It would examine the sources of conflict and division among Christians not only in formulated doctrine, but in those divisive factors in human life generally, including secular life, which set people against each other. Thus the supposed conflict between science and Christian faith became also its concern, as a place where theology and its secular critics clashed.

This confluence of interests brought about the jointly sponsored conference whose report and papers are collected here. Meeting last August in Mexico City, where a rising modern technological society and a rich traditional culture coexist uneasily, the participants focused on some of the fundamental problems within their mandate – the meaning of 'truth' in scientific and theological language, the ideas of nature and creation, the very concept of God itself. Keeping a lively appreciation of the social context of scientific work, they asked themselves to what extent science, and the modern technology which stems from it, can claim to be

FOREWORD

by Thomas Sieger Derr



an independent quest for truth and well-being, and on the other hand to what extent they are the servant of political and economic forces. From this question there developed the possibility of theological critique, although conference members were extremely wary of giving theology free reign to act as if it were competent to judge all the work of science.

Naturally enough, not all of the discussion led quickly to consensus. One of the most persistent and lively disagreements was over the intensity of the criticism to be directed at science, some participants ready to excoriate the scientific enterprise for its pretension to ultimate truth about the universe, others quite unwilling to castigate the learning which has advanced our knowledge so greatly and so usefully. A similar disagreement occurred over the evaluation of technology, though the burden of the papers might give the false impression that the anti-technologists dominated the conference. There were other disagreements, too, which the reader will notice, for example over the 'nature of nature' and man's proper relation to it. Conference participants came from several disciplines and varied cultural backgrounds, so that divergence of viewpoint was inevitable.

A word should be said not only about the differences of opinion but also about the rather different purposes of the papers. Some were written to be read primarily by lay people in the churches who are not familiar with these subjects, and so writing is introductory and expository, pleading with the reader to be drawn into the subject matter and become concerned. Other papers presume an audience with some expertise in the topic, and are offered as contributions to a continuing debate. So the collection offers something for a variety of tastes, something for nearly everyone, if not everything for any one reader.

The report, of course, represents the struggles of these different viewpoints and purposes. It bears the marks of dialogues, comes from the forge of ecumenical debate. It is not always easy reading; but as a testament to the current state of the conversation between science and theology, it will repay careful scrutiny.

REPORT OF THE CONSULTATION

Introduction

In recent years a number of critical ethical issues, stimulated by scientific and technological developments, have literally forced their way into public attention. How should we evaluate the risks of nuclear energy? What would we permit to be done to human beings, given the startling developments in the life sciences? How should we manage natural resources in view of the present and future claims of an expanding population?

Reflection on these questions quickly discloses a number of more fundamental issues lying behind them: the possibilities of technology and the shape of human destiny, social influences on science and its use, the interrelation of technology and culture, the relation between humankind and nature, the meaning of «creation» and of the God who creates. The variations on these issues are endless, and in one form or another the debates are also familiar. But the context in which they arise today is new, and the task of addressing them in this contemporary context is imperative, however immense it may be.

We offer here only a beginning to the work, adding at the end some suggestions for continuing the process. Our comments come from discussion among people of several nations and disciplines, and have benefited from a variety of experiences and backgrounds. We hope they will serve as stimulus, foundation, and guide to further thought.

I. THE ENCOUNTER OF THEOLOGY WITH SCIENCE AND TECHNOLOGY

The Contemporary Context

In the opinion of the scientists at the consultation, there has been in recent years a striking change in the attitude of their colleagues to religion and philosophy. Two or three decades ago the dominant note among scientists and their students was *science triumphant*. The mechanistic-deterministic world-view derived from Newton and Laplace dominated everyone's imagination even though, in principle, it was inconsistent with the theory of relativity and quantum physics. There was also universal confidence that the possibilities of scientific progress were unbounded and that, concomitant with the progress of science, the human condition would be steadily improved and all human problems would be solved. Many, though certainly not all, scientists believed that sufficient scientific knowledge would inevitably lay bare what was «good» for people. Hence all ethical problems would be resolved.

Such an evaluation of science has been shaken in the modern world. There is now a widespread recognition that to some extent the *results* of science – particularly the social sciences – and, in large measure, the *prosecution* of the scientific enterprise are determined by an implicit value-scheme, view of mankind, and attitude to nature. None of these can be derived from science. They rest on faith. This perception makes the scientist uncomfortable, so he is more open to discussion about basic issues with theologians and philosophers. Most scientists are theologically inarticulate. Many have a deep admiration for Jesus Christ. Many are still influenced by a childhood connection with the Church. Many, in existential despair, look to the Church or theologians to provide «answers» which will give meaning to their work as scientists.

Several aspects of the contemporary situation bring a new urgency to the dialogue between science and theology:

(1) *New ethical concerns arising from science.* Science-based technology has given us unprecedented power over nature and over our own future. New technologies have far-reaching and often unanticipated impacts on the environment and on society. We have the capacity to alter the genetic inheritance and the living conditions of generations yet unborn. Facing a world of finite resources, we must make hard decisions, trying to reconcile the often conflicting goals of technological progress, environmental preservation, and human values such as justice and freedom.

(2) *The growing sense of social responsibility among scientists.* Scientists are giving more attention than in the past to the possible consequences of scientific discoveries, and are participating more actively in public discussion of policy issues related to science. Professional associations are encouraging the analysis of issues arising from the interaction of science and society. New mechanisms are being sought to balance the autonomy against the public accountability of the scientific community.

(3) *Loss of confidence in science.* Scientists no longer assume that their work will automatically contribute to human welfare. In a time of inflation and budget cuts, financial support of research has been reduced in many countries. Among the youth of affluent nations there has been considerable disillusionment concerning technology, criticism of the depersonalizing impact of industrial society, and in some cases attacks on scientific rationality itself in the name of spontaneity and imagination. Developing countries are beginning to see the destructive effects of technology on traditional cultures, and the ways in which technology transfer can become a form of domination by industrial nations.

(4) *Wider recognition of the limitations of science as a way of knowing.* Dogmatic claims that scientific knowledge represents final and exhaustive truth about the world are seldom heard today. A common view is that scientific theories are limited and instrumental models which permit prediction and control, not descriptions of the world as it is in itself. There is an increasing awareness that the directions taken by scientific research are determined by industrial needs and cultural assumptions and not by the pursuit of truth alone. Scientists are human beings motivated by professional ambition and the availability of grants, as well as by disinterested inquiry.

These and other factors in the situation of science and technology today open up new possibilities for a creative encounter between them and theology.

However, theology seems to be in extraordinary disarray. Not only are there the traditional differences associated with the classic confessions of various denominations, many of which are experiencing a resurgence of self-consciousness, but today there is also a wide variety of streams of theological thought which cut

across confessional lines. These have arisen in attempts to respond to acute issues of recent times. They include the death of God theology, process theology, secular theology, black theology, liberation theology, charismatic theology, and others. These theologies differ not only in their emphases or focus of interest, but even more fundamentally in their understanding of the nature and function of the theological task, ranging from a celebration of the secular as the prime locus of divine activity to a new quest for the transcendent and metaphysical, from «story-telling» approaches to religious insight to new mystical visions. This diversity tempts theologians to be so introverted that they have no time, energy, or interest to engage in the demanding process of real dialogue with their scientific colleagues. However, this radical debate among the theologians also tends to diminish their erstwhile dogmatism and enables them to be more resilient in their discussion with scientists. Many scientists, for whom rigorous debate between incompatible scientific theories is a familiar process, should be able to understand and sympathize with theologians in their present situation. As they become aware of the problems of contemporary theologians, scientists may revise their past stereotypes of the theologian, thus making dialogue much easier.

The Search for Common Christian Understanding and Action

How shall the churches make their views and opinions known to the scientific and technological communities, to their own members, and to those outside the faith? Who speaks for the Church, and what methods are open to those who seek to engage on behalf of the Church in dialogue with scientists and technologists on such questions? The churches live in very different social and cultural situations. Not all of them are in a position to open and organize a systematic dialogue between scientists and theologians. Some are handicapped by their minority status within their culture. For some, political and ideological discrimination makes regular contact with the scientific community hardly possible. Yet exactly in such situations many Christians, both theologians and scientists, feel the challenge and seek for orientation. It is a major responsibility of the ecumenical fellowship to help these Christians by sharing with them information about, and new insights arising from, the developing ecumenical dialogue between scientists and theologians.

Several issues are posed:

(1) Is it desirable to proceed in terms of general statements or in terms of specific problems or disciplines? There is at present a tendency to favour a contextual approach, focusing on specific ethical issues raised in specific problem areas. Hence the contemporary interest in bio-ethics, in the relation of theology and ecology, and in the area of nuclear energy. At the same time it is already apparent from the discussion in each area that there is a need for certain ground rules on the ways of relating the discussion of technical questions to questions of value. This meeting in Mexico City is an example of the felt need for an inquiry which transcends the purely contextual approach and which attempts to understand the sweep of the debate, the way in which conclusions reached in different contexts illumine the whole field of concern.

(2) There is the further difficulty over the manner in which the Church expresses itself on theological and ethical issues. It is in part an ecumenical problem: How is it possible to draw together the insights of the many different confessional and theological positions on such complex issues without doing injustice to the views and conscience of many church members who may disagree? What is needed is a review and perhaps reformulation of some of the historical ecumenical procedures and methods for trying to achieve common Christian perspectives. In the past, one way has been to try to reach agreement on criteria or principles as a guide for immediate action, thinking of them as *proximate* norms, but guarding against any tendency to give them absolute sanction. There are dangers in all methods, but ecumenical experience has shown the value of finding some means of making such tentative recommendations: as a stimulant to new and creative action in situations where there is complacency; as a standard for measuring ecumenical responsibility in local and regional conditions; and as evidence of the Church's ability to encourage encounter between fiercely opposing viewpoints, drawing from such encounters the hope of new understanding, reconciliation, and the possibility of a strengthened common Christian witness and action in the world.

(3) Finally, what manner of interpreting the faith is most likely to help illuminate the ultimate spiritual problems of science and scientists today? Churches and ecumenical bodies find it easier to express an opinion on social policy than they do to present the implications of belief in Jesus Christ for a scientific culture. Some churches simply evade the issue while others tend to revert to the semi-fundamentalist absoluteness of certain types of conservative evangelicalism which often glories in the gap between faith and scientific truth.

II, THE SOCIAL FRAMEWORK AND RESPONSIBILITY OF SCIENTISTS

The Impact of Science and Technology on Different Cultures

Our world is not a one-culture world. It contains varieties of culture, as the differences of language suggest. Each culture expresses its own community's sense of value. Culture is a historical reality which humans create and participate in, and by which they are nourished. Sudden and massive disruption of a culture by the impact of science and technology is experienced as both a creative and a destructive moment in its history. In each cultural zone the encounter of the traditional culture with science and technology has presented not a uniform reaction but one of rich diversities. How the human spirit is struggling to create and maintain its sacred identity at this intersection between the *traditional* (historically and anthropologically familiar) and the *new* (historically and anthropologically unfamiliar) is one of the great themes of contemporary history. Today there is hardly any cultural situation which enjoys a tranquil continuity. If the human spirit is labouring to find a new meaningful set of values within this global context of cultural upheavals, is it not precisely at this point that the mind of theology and the mind of science and technology should encounter each other?

In discussing the impact of technology on cultures it may be useful to distinguish between (1) technology as an *instrument* or *tool*, and (2) technology as a *system*. The first implies that technology is devices which multiply human powers and may be used for good or ill as people choose. The second suggests that echnology is a constricting monolith which commands our lives impersonally and relentlessly. Neither of these ways of looking at technology exists in reality as a pure state without the other; for tools are part of a complex cultural system, and the system allows for novelty and creativity in the use of its tools. But as «ways of seeing» the distinctions can be useful.

In the first case technology is seen to be *used* by human beings, is *subordinated* to their freedom, and is an *instrument* of their intentions. In this case culture cannot be thought of apart from tools and instruments. They express the stage of development at which a culture has arrived; and we commonly think of a civilization possessing sophisticated tools as a «developed» or «high» culture. Tools, in this more positive view of technology, liberate men from burdensome toil and make possible a flowering of the human spirit. They may be thought of as *neutral*, at the service of mankind for good or ill. Where they are misused, that is the fault of people, not of technology.

Certainly there is much to be said for this appraisal. Technology and science have improved our health, lengthened our lives, enhanced our freedom of choice, and given us leisure time to use, if we will, creatively. One need think only of the invention of printing, for example, to realize the richness that «technique» has brought into our lives, to say nothing of the discoveries which have conquered diseases, the agricultural science which has given us the means to end starvation, and so on. It would be a myopic argument which viewed these developments solely as inimical to our freedom and well-being.

The second case, on the other hand, emphasizes technology as a system. In this appraisal, which a more negative view considers to be the dominant trend of this historical moment, technology has ceased to be at the service of human freedom, has developed its own dynamics which often transcend ideological boundaries, and has become a complex system radically changing human nature. Rather than using their tools, human beings are dominated by them. Modern technology cannot be understood merely as a complex of scientific insights and technical developments. Rather these elements are closely interwoven whith economic, political, and military interests. It is this total complex which is meant by the phrase «the technological system». The expansion of technology will generally correspond with an extension of economic and political control. If this is the case, the technological system cannot be understood simply as an ever-growing power to produce goods. It has to be seen as a force which disruptively changes the relationship of humans with each other and with nature, and consequently transforms human self-understanding.

The technological system takes different forms in diverse cultural, social, economic, and political contexts. Thus in some situations political decisions put economic power almost entirely at the service of technological development and the scientific research needed to extend it, intending to change social structures as rapidly as possible towards what is seen as a better life. In other situations the decision may be for selective technological growth in an attempt to preserve certain cherished cultural forms. In still other cases the technological system may grow without centralized direction, the result instead of preferences expressed in the market place. And there are many variations on these different situations. But no matter the superficial differences, this analysis suggests, there will be in all such contexts an essential underlying similarity.

In the technological system many human beings experience themselves either as helpless cogs of a huge machine or as mere functions of an impersonal structure which they cannot control and hardly understand. This situation also conditions their relationship with each other, which becomes increasingly impersonal, instrumental, and competitive. Effectiveness, as a prerequisite of successful technological operation, requires rigid subordination of humans to time as it is determined by the rhythm of the machine which is indifferent to the human biological rhythm. In the same way, the modern metropolis is not a natural organism, but a mechanical extension of technological dynamics forcing people into artificial, often uniform patterns of life. Life dominated by technology is governed by the logic of production and consumption, leaving, according to this view, very little room for non-purposive and playful activities.

In a parallel way, this second analysis judges that the relationship between human beings and nature has become soulless and instrumental. Nature is considered as raw material waiting for transformation. This means the loss of the intrinsic value of nature and of its aesthetic and mysterious dimensions. It is no longer a realm of grace.

The tragic by-product of the technological system is finally a gradual distortion of human self-identity. Human beings are reduced to their usefulness for the technological system. Once they become obsolete, they know that they are expendable and unnecessary. This is a source of anxiety and loneliness.

And finally, according to this somber appraisal, the technological system has an important international political consequence. Since sophisticated forms of technology belong to presently wealthy and powerful nations, those countries which are not in this privileged position will be subjected to their control. The transfer of technology therefore does not necessarily contribute to the self-determination of the receiving country. Thus the poor nations of Africa, Asia, and Latin America find themselves in a particularly difficult dilemma. If they accept the import of foreign technology into their countries, they will be subject to political and economic domination. If they decide, however, to develop their own technology, they risk being condemned to a subordinate position in relation to the wealthy nations of the world, since this process of autonomous technological development tends to be slow. Whatever option they choose, they will have to take into account the implications of a technological system.

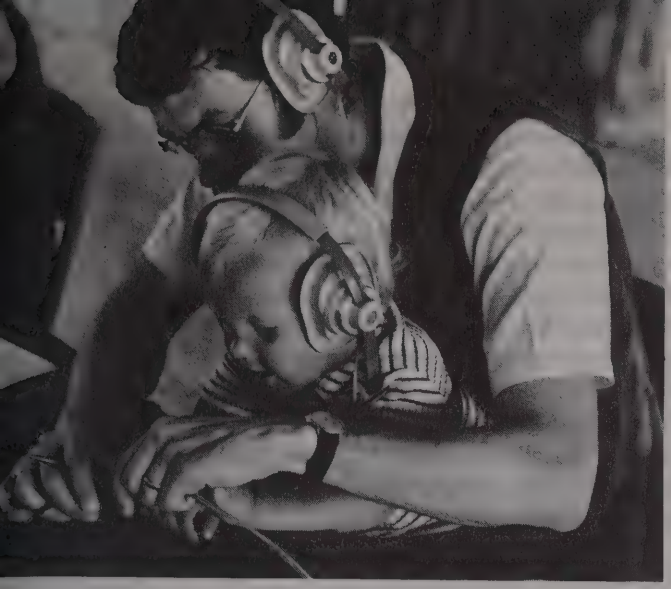
These negative factors would add up to a damning indictment of technology if it were to be seen *only* as «system». But we must remember that it never entirely loses its instrumental or «tool» character, and so redeeming features are also present. The ethical and cultural significance of technology seems finally to be dependent on which aspect is seen to be dominant, whether it is used by a culture as the instrument of its higher purposes or whether it develops into an autonomous controlling system. It would be worth future WCC study to see if it can be determined whether the outcome depends on social, economic, and political conditions, and if so, what they are.

Social and Political Factors in Scientific Work

Given the cultural impact of science and technology, it follows inevitably and obviously that scientists and technologists must act for the good of their fellow human beings. And their «fellow human beings» must mean all mankind, irrespective of its many divisions, a conclusion not only drawn from Christian universalism, but also supported by the precepts of scientific investigation itself. Scientists claim universality for their findings, and generally insist that the results of their work be public and open. The impact of that work spreads across the face of the globe, and social responsibility accompanies it. The love of God and human love meet in the Christian doctrine of stewardship and in the humanist emphasis on the trusteeship of human beings in the disposal of the earth's present resources and in the maintenance of a bountiful, beautiful earth for all generations to come.

If the general direction of the social responsibility of science and technology is fairly clear, the means of fulfilling this responsibility are considerably harder to identify. The activities of scientists and technologists require very large expenditures of money. This money comes from three sources – governments, corporations, and various tax-free foundations and agencies – though the role of governments will in fact order the priorities for science and technology in such a way that the interests of mankind will be served. In our present-day world we observe that many governments are often not concerned with the interests of the people over whom they exercise authority, and even less with mankind considered globally. Too often then, decisions in science policy are made that advance the interests of a small section of society, or a national self-interest at the expense of other nations.

There are also social priorities for science that relate particularly to the state of a people or nation wherein the science is done. What sort of science should be given a priority of zero? In a dev-



eloping nation whose people are desperately in need of food or ome other resources, and in which education must be oriented towards survival and improvement of the standard of living, it is, to ay the least, a luxury to support basic science that is not likely to ssist the people in a material way for decades to come, if ever. In nost societies, the diversion of funds for research and development to military ends is overwhelming and gravely distorts proper riorities. In our view, there is also science that should be given ittle or no support because, even if it is successful in attaining its bjectives, these are trivial or threaten to release evils upon humanity of perhaps devastating proportions. There will of course be nuch difference of opinion as to what is trivial or extremely hazardous.

Yet no science is totally worthless, even though a particular liscovery may be trivial or a piece of research fruitless. This is beause, quite apart from social and economic applications of knowedge through technology, all knowledge is wisdom which helps is to understand humanity's place in nature, illuminating our nysterious journey from birth to death. These values are not imply aesthetic but aid us to experience the dependence of people n nature and on God and to live in harmony and serenity.

The distinguishing feature of governmental decisions in cience policy concerns the relationship of these decisions to technical advice. Even when governments wish to serve broad human nterests, a dilemma remains. If government does not receive roper advice, the pattern of support to science and technology vill be ineffective and wasteful. If government leans only on cientific advice, a technocracy results. The problem of the proper alance of lay people and experts on bodies making technical deisions is crucial.

Inasmuch as the whole people are affected in their ways of fe by such policies and decisions, it seems essential to a demoracy to establish in matters of science and health policy two levels f advice: (1) a lower level that might be called a peer review; and 2) a higher level by a general review board which contains repreentatives not only of the scientific and technological groups but lso of the law and politics, ethics and religion, and the consumer nterests of the public. In general, the lower panel would assess echnical merit, the higher board would determine the level of upport and allocation of resources. Such systems do seem to be volving in some countries at the present time. Even under other nan democratic societies, some way should be found to institute quivalent systems of review. We believe that omission of this seond level of review and policy-making seriously threatens to eave important decision-making to the narrow views of technical pecialists or political bureaucrats, who may overlook important econdary effects of their decisions, and who do not have the full erspective of social needs in mind.

While the above proposals should be helpful in setting priorities for *science*, the problem of setting priorities and establishing safeguards for *technological* innovation seems far more difficult at the present time. Technology assessment in all countries is either non-existent or still in embryo. We believe that intensive study must be devoted to the ways and means of assessing technological innovations. Adverse long-term effects and side-effects must be balanced against immediate benefits. Somehow, mechanisms in which ethical issues and religious values are given due weight must be devised. The churches may play a significant role in the invention of such social devices for minimizing the disruptive and harmful effects of new technology.

Only rarely in pluralistic societies will the churches as organizations be consulted on these problems; and in some other societies, where the reigning ideology excludes the churches from public life, they will always be denied a voice in such consultations. But Christians who are also scientists or technologists will often find themselves on such bodies or in a position to influence them. It is through these individuals that theological insights may be brought to bear on technical issues. Hence ethical issues which arise can be considered at both levels of review, and in both of them Christians may be involved. At the level of peer review, it is furthermore needful to involve scientists and technologists in conferences, study groups, and educational programmes that present the ethical issues broadly and fairly from the standpoint of leaders of ethical and theological thinking, as well as from the standpoint of social welfare and economic development. For this purpose much cooperative preparatory work must be done by religious groups. Such efforts to affect the views of professional leaders and workers should also be extended more widely to the preparation of discussions for high school students, college and university students, and in particular graduate students.

At the second level of review, direct representation of humanists and religious leaders on the boards and commissions as well as representatives of affected groups, should assure that the effect of scientific and technological innovation on the spiritual nature of man will not be ignored.

The World Council of Churches should explore the ways in which, in different national situations, the churches might aid in the general understanding of the ethical and theological aspects of grave current issues developing from the applications of science. Several recent ecumenical encounters between theologians and scientists in the areas of genetics, nuclear energy, and ecology indicate some of the ways this task can be carried out:

(1) An ecumenical discussion on Genetics and the Quality of Life[1] has highlighted the need both to make positive and creative use of the new discoveries in genetics (especially in the correction of genetic defects) and to maintain a constant criticism of a purely technical approach to such problems. Geneticists and theologians were also agreed that «neither Christians nor humanists can meet the future on the basis of past authoritative answers, that human decisions require expert scientific knowledge but that scientific knowledge does not itself constitute moral wisdom or sensitivity to human values». The group tried to suggest criteria for the positive use of such techniques as prenatal diagnosis but realized that much more discussion and reflection on the implications of these techniques were needed. It pressed for continuing study of the difficult and unresolved issues arising from the use of artificial insemination, the prenatal study of human embryos, and the meaning of the sanctity of human life.

1. For report and papers of this consultation, see *Genetics and the Quality of Life*, edited by Charles Birch and Paul Abrecht (Pergamon Press, 1975), 232 pp.

(2) A recent Ecumenical Hearing on Nuclear Energy[2] involving nuclear technologists and theologians (and other «non-experts») has started a theological critique of the assumptions implied in the choice of nuclear energy programmes. «The choice of nuclear energy involves an act of faith in humanity: that it will be able intellectually, technically, psychologically, morally and spiritually to master the awesome possibilities of nuclear power. The nuclear option implies a high level of discipline on the part of all people. It also requires a realistic assessment of the need for checks and balances necessary to minimize the effects of human folly and sin. On what assumptions is this faith credible? How far does it rely too much on human rationality, efficiency and achievement orientation?»

(3) A discussion has started in the churches on ecological responsibility which is pressing Christians to face up to the moral and social challenges of an earth being depleted of its resources. The emphasis is on the need to work for a *sustainable and just society*[3], where the rate of using non-renewable resources does not outrun the increase in resources made available through technological innovation, and where at the same time resources which are available are equitably distributed and used. Clearly such a sustainable society will be possible only where there is acceptance of new obligations by people to nature and a new awareness of world economic and technological interdependence.

III. SPEAKING OF GOD AND THE CREATION IN A SCIENTIFIC WORLD

The Critique of Scientific Knowledge

Ethical problems arising from the situation of science and technology, and their relation to theology, are now familiar and have been considerably discussed in ecumenical circles. The problems arising from the situation of knowledge and ideology have not been so frequently discussed in these circles, but also are important for the relation between scientific and religious belief-systems. Even many Marxists will agree that beliefs have a certain autonomy in their interaction with political and economic situations, and the study of conflicts of belief in relative independence of their practical applications is therefore necessary.

Since the scientific revolution of the 17th century and the French Enlightenment of the 18th century, natural science has commonly been regarded as the primary way of attaining knowledge and truth. Truth itself has been defined as the correspondence between a body of scientific ideas and propositions about the external world. At first the scientific method of attaining true propositions was most successful in astronomy and physics and later in biology. In our century claims have been made that this method will eventually uncover also the natural laws of the human psyche and of society.

The extreme positivist and reductionist view of science has been associated with a popularly influential scientific world view which still retains a strong hold over the lay public, over many scientists and science students, and even over church congregations. It is a world view which either rejects outright, or finds great difficulty in incorporating, any belief in a transcendent God or in his interaction with the universe, or in any destiny for man and nature other than the heat-death or continued recurrence postulated by the models of physical cosmology. But however well established this world view appears to be among some people, it has nevertheless had to face a number of objections which have led others to abandon both the world view and the scientific definitions of knowledge and truth which go with it.

2. «Report on Nuclear Energy», *Anticipation*, No. 21, October 1975.
3. See Report of the World Conference on *Science and Techology for Human Development*, Bucharest, Romania, June 1974, published in *Anticipation*, No. 19, November 1974.

Some of these objections are:

(1) The secular ideology historically derived from science is not logically demonstrable from science. Even if the claim of science to be disinterested pursuit of truth is acceptable, such science would not be capable of yielding judgments about the limits and meaning of human life and of nature, of arriving at a hierarchy of values, or of excluding the possibility of transcendent meaning, in short, of God. To suppose that science implies an ideology of values and meanings is to neglect Hume's dictum that «is» does not imply «ought»; and to exclude God on the grounds that he is an «unnecessary hypothesis» (Laplace) is to suppose that science is totally competent within its own methods to deal with all aspects of the world and human experience. These suppositions are now widely challenged.

(2) The scientific method of generalization, theorizing, and experimental tests does not necessarily lead to unique theories. Several recent studies (e.g. Kühn, Bachelard, Foucault Feyerabend have sought to show that the history of science does not demonstrate a continuous progress towards more and more adequate true descriptions of the world, but rather a discontinuous sequence of models or paradigms which may have accumulating instrumental success, but differ fundamentally from each other in their account of the nature of things. For example, physical cosmology moves from the geocentric Ptolemaic world through the heliocentric Copernican world to the a-centred world of relativity theory. The theory of matter moves from Newtonian mechanical atoms, through the continuous «non-material» fields of energy, to an uneasy amalgamation of continuity and discontinuity, determinism and uncertainty, in quantum physics. Biology moves from vitalism through the attempt at mechanistic reduction to physico-chemical concepts, to a newly awakening suspicion that life and mind may after all demonstrate non-reducible emergent properties. All these are examples of unfinished histories, and it can be argued that the lessons of the past indicate that there is no end to the sequence of widely different fundamental models in natural science as we now practise it. It cannot any longer be uncritically supposed that natural science provides any uniquely acceptable or perennially true answer to the pre-Socratic question, «What is the world made of?»

(3) If this account of the provisional character of scientific theories is accepted, it becomes clear that the kind of truth which science may attain is concerned with structures of regularity in nature, and with the possibility of predictive control which these regularities permit. It is not concerned with final answers about the nature of the world, and earlier scientific definitions of knowledge and truth which claimed that competence now become false.

(4) A further point follows regarding the scientific theories that are actually adopted in particular historical situations, even though they are not wholly determined by experimental facts. In the social sciences, it is very clear that theories are often adopted on grounds that are economic, social, political, and ideological, and that all social theories are value-laden. For example, theories of «economic man» have presupposed some version of utilitarianism; current American sociology based on the notions of stability and consensus may reflect the social acceptance and integration of the sociologists, who thus risk losing their critical perspective on society; in Marxist societies political and economic theory must not contradict the official Marxist ideology; and anthropologists' reports of exotic societies have fluctuated in character according to whether the relation of the anthropologists' society with the exotic society was one of colonialism, liberal tolerance, or active participation in liberation movements. Even in natural science, sociologists of knowledge are accumulating examples of such influences on the character of scientific theories. Scientific theoriz

ing cannot therefore be described as a disinterested pursuit of truth, indifferent to all judgments of meaning and value.

(5) The decision to do science in the interest either of predictive control or of finding a series of imaginative and ingenious but not finally true models of the world is itself a value judgment. Why should it be made? To the 17th century scientist the answer appeared obvious and was perhaps then historically valid, but there are studies that indicate that the positivism and value-neutrality of science from the 17th to the 20th centuries was itself a product of socio-economic and political forces. In the 20th century the results of scientific technology and the secular effects which accompany it have made Christian justification for positive science far from obvious. It may be that there is no justification for the continuance of certain kinds of scientific research. Such a decision would have to be made on the basis of values not derived from science.

Finally, in the light of this changing perspective on science, what is the position of science vis-à-vis the assumptions of theology? In the past this relationship was one of a clash of ideologies, and it is still seen as such by many people. But if the more modest view of science just outlined is accepted, this may be thought to ease the problem of the status of theology by removing scientific claims to final truth from the fields of essence and destiny, value and meaning, where theology is at home.

The Critique of Theological Knowledge

Mediaeval scholastic theology for long presented itself as the fundamental science, the science of the Ultimate Being, the cause and foundation of all other penultimate, derivative, and caused beings. Theology could therefore be demonstrated, organized, and taught as the other sciences are now in a deductive way; even the superiority of theology as science over the different branches of human knowledge was due to its eminence, combining simplicity and totality, God's revelation and human assertion.

The attacks against this claim for theology came first of all from religious faith itself. Was it possible and legitimate to make an equivalence between Being as the cause of all that exists, on one side, and the living God of the biblical testimony, who is not a demonstrable cause but both a hidden and self-revealing person? We encounter God through personal decision and personal illumination, not by impersonal demonstration. To make God the object of a scientific investigation is to subordinate his freedom and sovereignty to human power. Thus theology conceived as the science of God could become the enemy of God's approach to humanity through revelation, and of humanity's approach to God through faith. Theology would destroy the biblical mode of encounter between God and humanity.

From another point of view the attacks against assertions of the scientific character of theology became strong when the modern mind began to reserve the word «science» for hypotheses proved by the repetition of empirical experiment, by the persuasiveness of human reason, without any kind of divine illumination or of faith decision and conviction. The method of hypothetical, experimental demonstration made it impossible to attribute to theology the character of a science.

Still a third attack on the pretension of theology came from a sociological perspective. Just as scientific theories reflect the historical and cultural settings of those who construct them, so also is theology a product of its time and culture. It is not perennially valid. This conclusion had, of course, been reached independently already by anthropological studies of the variety of religions. It is a conclusion that has yet to be faced by a theology that claims in some sense to be an expression of perennial truth.

Thus both the internal difficulties and the external attacks seemed to put a wall between a true modern science and a dubious theological expression. Kant was the thinker who took seriously the religious difficulties and the epistemological attacks. We recall briefly his own solution, so important in subsequent history: we can have scientific knowledge only through our understanding of the empirical field, where God is not to be observed, verified, and proved. But, for Kant, reason, particularly in its practical orientation, surpasses empirical understanding. God exists as an idea of practical reason.

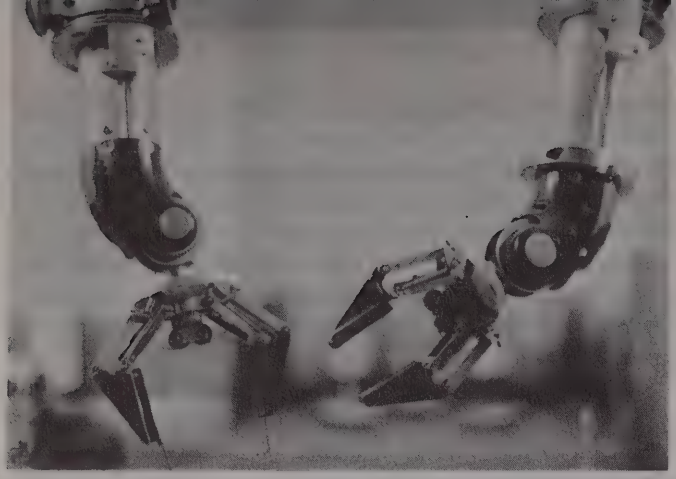
This solution of Kant was correct in taking into account the religious character of belief and the scientific character of knowledge. But the danger of the solution is also very evident: is it then possible to say that we know God, or are we obliged to say that we are only waiting on him? May we have knowledge by faith, or must we have agnosticism because this «knowledge» is only belief? This question seems to express, in an acute way, the modern hesitations about the status of theology. These hesitations are bringing both critical purification and personal trouble: the encounter between theological language and scientific language obliges each of us to be humble and clear, modest and sure, honest and decisive.

Several observations are in order. First, human knowledge is more extended than scientific discoveries reached by the rules of objective repetitions. To know truth is also to discover values to which we relate in a subjective manner. When we say «subjective» we do not refer to arbitrary, esoteric, irrational, illusory imaginations and aberrations, but interpersonal, universalisable, meaningful confessions that are validated in the life of a community. It is in this sense that it seems better to speak of faith in God than of human belief.

It seems also important not to renounce the knowledge character of faith, even if we must be cautious in our linguistic expression and avoid insisting on the scientific character of this language. By «knowledge» in this case we mean the discovery, the confidence, the intimacy, and the power for change which occur in the faith encounter. Here we recognize values not only of consolation, or courage, or energy, or hope, but also of truth, that is, the identity or name of what is here encountered. It is in this sense that we can understand Jesus' saying «I am the truth». This is the sort of truth which is not to be possessed or demonstrated, but rather acknowledged and followed.

It is interesting to observe that today scientists hesitate to use the word «truth» perhaps because of the changing «models» which try to do justice to the complexity of their observations. Perhaps the claim to «truth» seems too ambitious. In theology we can observe the same hesitation because of the danger of reducing theological truth to a doctrinal summary. Perhaps here also the word «model» would be more adequate to the changing theologies. But even if, in both cases, we use the word «model», we should preserve the word «knowledge» in anticipation of a to-be-discovered truth.

Clearly there is much more to be said on this complex subject, and more than one way of approaching it. Among the different senses of «truth» must be included not only the objective verification of hypotheses by repetition, as in science, but also encounter with meanings which require decisions, with events which call for obedience, with words which offer blessing and promises. One cannot dismiss such encounters as merely ideological uncertainties, sociological conditioning, or authoritarian orthodoxies. Most modern scientific methodology is too modest to wish to do this anyway. Because «truth» means more than the products of any single method, the encounter between scientific objectivity and theological confession can be fruitful, both being thought of as offerings to human knowledge.



Changing Models of the Universe

The new dimensions to the contemporary encounter between science and theology include, in addition to the evolving status of scientific and religious knowledge, some fresh thinking on the old classical theoretical questions, like the nature of God and his relation to the cosmos.

In Newtonian science the central fact about the universe was its independent existence subject to law. All objects in the universe were mechanisms, some of them very intricate, whose characteristics were to be understood in terms of elementary constituents which made them up. Space, time, atoms, and stars were simply given, static, and eternal, a fixed stage and secure foundation upon which the evolution of life and mankind took place. These elements of the universe were not contingent on anything beyond themselves. They were simply there, always had been, and always would be. This is still, unfortunately, the scientific picture of the world held by most people in the churches.

The middle half of the 20th century has changed all this in two fundamental ways. The universe as a whole and everything within it is now seen to have a history. Everything is born, develops, and ultimately must die. Nothing is self-explanatory or eternal. Our particular cosmos emerged in the beginning equipped with three spatial dimensions, time, and a particular form of matter governed by particular and contingent physical laws together with at least three fundamental constants whose numerical values seem to have been arbitrarily chosen. During the first few hours of its history, this original matter formed itself into atoms of hydrogen and helium, and this was all there was for a long time thereafter. Much later the hydrogen and helium separated under gravity into large masses which became galaxies. Long after this birth of galaxies, stars were formed within them and the evolution of atoms began. In time all the atoms beyond helium were formed within stars. Then much later, on our earth nucleic acids and proteins were produced out of methane, ammonia, and water in its atmosphere. From these, living cells were constituted, and finally the human race was produced. But people die, the sun and the earth must finally die, and ultimately all atoms, galaxies, and the universe itself must die. Nothing – not even space, time, matter, or the laws of physics – is self-explanatory. This is the most radical contingency imaginable. Why and for what purpose was this particular cosmos brought into existence in the first place? What accounts for the fact that the design of its atoms and the laws governing their behaviour made it possible finally to produce the human being within it? The cosmos did not have to be at all, and it certainly did not have to be designed in such a way as to make humanity a possibility. Such questions have no answers within science, and their contemplation leads to some sort of theological inquiry.

In parallel with these developments, much has happened to Newtonian science and its associated mechanistic models. Chance and probability have entered all areas of scientific accounts of the course of events in time. Every entity in nature from electrons to human beings now has alternative ways of behaving in identical situations. Among these alternatives, scientific causality is explicitly renounced where probability is admitted. There remains a considerable degree of necessity but no longer a rigid determination. Moreover, entities in nature are no longer mechanisms, but rather systems in a hierarchy of levels with properties which are truly novel and not derivable from the elements of which they are formed. As the universe develops, it can follow many different paths as a result of the probability choices freely made by each entity in it at each moment. The cosmos has acquired a degree of freedom to react to the varied situations which confront it as it evolves.

One possible interpretation for the course it has actually taken, among the infinity of others it could equally well have taken in its long history, is that it has been continuously responsive to the lure and attraction of a creator God. If so, it has had to be so within the limits imposed by the necessities of its physical structure and the laws which govern its course through time. But within these constraints, it has still had enough freedom to go from hydrogen atoms all the way to the human.

Thus science in the middle fifty years of the twentieth century has done two major things. It has introduced a radical contingency or dependence for the whole cosmos which can no longer be taken to be self-explanatory, and it has relaxed the rigorous necessities of its previous ways of explaining nature and mankind. In doing so it has raised a whole host of questions which by their very nature can never be answered within science. These new aspects of science are quite recent and are not widely known. It is important that they become known within the churches. The questions insistently posed by this new scientific view of things ask for theological answers.

God and the Cosmos

All such theological answers involve the problem of understanding how God is related to the cosmos. To what extent does he transcend his universe, standing apart from it as an artist from his work; and to what extent does he operate within it, pervading his whole creation in such a way that all elements of the cosmos are continuously responsive to his presence and creative energy? This is the historic problem in theology of transcendence and immanence. The new view of the cosmos in science, with its strong suggestions of contingency or dependence on something other than itself, and its openness to creative possibilities, constitutes a fresh opportunity for dialogue with Christian theology.

(1) This theology is based, according to one classical formulation, on the incarnate Word of God or unique Logos through whom all things were and are being made. This Word is both transcendent, since he is with God and is God from the beginning, and is also immanent in all creation, which has come into being and is in a dynamic process of becoming through him. In the fullness of time the Word was made flesh and dwelt among us so that we beheld his glory. The Word or Logos renders the whole creation meaningful. This Logos-centered presence of God in and with nature does not demand knowing and perfection for the universe, but takes into itself all the ambiguities and risks of creaturely existence. Because the Word has become incarnate in humanity, its use of knowledge as power for domination and exploitation, and the self-contradictions of all human undertakings, have been assumed by the same creative energy through which all things have been and are being made.

This specifically Christian Logos-based doctrine of creation, which affirms the inseparable, active, transcendent-immanent involvement of God in creation, has always to be understood as hope for both humanity and nature in spite of the tragic contra-

lictions of nature, history, and the human predicament. It is at the ame time conformable with the new scientific view of the cosmos n that it conceives God as creating continuously within it, without eing at the same time confined within it or identified with it.

(2) Another way in which Christian theology has expressed he relation of God to the cosmos is through the covenant metahor. The covenant is a master image for the relation of God to *nankind*. But the Bible does not speak of mankind alone. In both of the Genesis creation stories, in the Psalms of praise and disress, in both the Pauline and Johannine Christologies, in the recapitulation prophecy of Revelation – everywhere the cosmos is lso present, associated to the God-human covenant story. In expressing this cosmic presence we do have to bear in mind the uniqueness of mankind – the only image of God, the called partner of God in the covenant, the special responsibility of Adam and Eve, the human Jesus as the Incarnation of God. But we also have o remember the constancy of non-human cosmic nature, for both nankind *and* non-human nature are together God's creation.

We must preserve the precision of the biblical vocabulary in expressing these two different relations, between God and the human and between God and non-human nature. Metaphorically it s said that *mankind* is «called» to salvation, by confession, repenance, and prayer, and also to «contest» with God and «hope» on im. Non-human nature is promised instead to be «delivered» after praise and groanings, and after «waiting» on God. In both ases there is life. For instance, flesh and spirit (*basar* and *nepesh* n Hebrew) are recognized in non-human nature as they are in the uman. We do not find in the Bible any kind of dualistic separation etween humanism and naturalism at the biological level.

But in the biblical view it is also clear that men and women re the speaking, answering, refusing and accepting partners of God. We do not find in the Bible any kind of monistic confusion etween anthropology and cosmology. On this point we find a correspondence between the biblical vocabulary and scientific observation, because science can support neither a humanism separatng people completely from nature, nor a mythology which confuses the two and makes humanity disappear into nature. The biblical background, without any pretentious claim to fixing the place of science, may help scientists in proposing to them a view of the similarities and distinctions between human and non-human creation, and of the distinctive responsibility of human beings n and for the cosmos.

(3) Still another way to express the relation between God and he cosmos is in language which emphasizes more strongly the continuity between the human and nature. Here, too, the non-human creation is more than a stage on which the drama of human ife is performed. But the value of nature is expressed differently, n terms analogous to those often used of mankind. Like man, nature has subjectivity. It has value in itself, for itself, and for God. In our use of plants and animals we need to discover a balance between their instrumental value to us and their own intrinsic value o themselves and to God. We need a concept of nature which enables us to see trees and animals as more than things and as a part of creation, like us sustained by and dependent upon God. This involves a conception of God's action in the world which is consistent with our scientific understanding of the created world.

The greatest difficulty in relating the theological doctrine of God's action to scientific understanding lies in the problem of assigning specific, observable consequences in the world to divine causality. Any relevant restatement of the doctrine of creation should make clear what no longer seems a relevant way of conceiving of God's action in the world (i.e. deism).

An analysis of the intrinsic value of the non-human creation n relation to the human (is not a person of more value than many sparrows?) demands an enquiry into the hierarchy of value in the non-human creation. Presumably this would be based on the capacity for sensitivity, which in its turn is probably related to the sort of nervous system or other analogous sensory system. Another way of saying this is that intrinsic value is related to the existence of the subjective aspect in all creation. Created entities are both objects and subjects.

The development of a doctrine of creation as a non-materialistic doctrine of nature could be a challenge to the dominant mechanistic world view due to science (or its misunderstanding). We would then see matter in another light. The reaction against sheer materialism has led to interest in mysticism and in the occult. Has not Christianity something to say in comprehensible language that provides a credible personalistic alternative to materialism? The time is ripe to speak about the world and its inner significance and nature. We may then catch a glimpse of the universe as sacramental, as a universe and not a multiverse, as personal and not just material.

The concept which one finds in parts of the New Testament of the whole of creation as an arena of struggle, of divine participation, and of hope is one that could have profound meaning to men and women today. It is a unitary view of life and the world which theology has, with certain important exceptions, largely neglected. Humanity and the world need to be saved. A doctrine of creation should be spelled out in terms that could help to meet people at the point of their deepest sense of estrangement from their fellows, from nature, and from God.

The Idea of God in a World of Science

From these various descriptions of the relation of God to the world (which, despite their different emphases, have much in common), we were led to speak of the God who acts in creation. In a scientific world is it possible to speak meaningfully at all of the creator God? Is there, for example, for scientists a possible tension between a personal God as experienced in revelatory events and God as the sustaining principle of the universe?

The experience of God in the Christian community, stemming as it does from the biblical witness, has been traditionally understood as an experience of God who is active in history, showing himself in certain events (e.g. the Exodus, the catastrophes of Israel which evoked the prophets, the call of individuals, events in Jesus' life, and for Christians, supremely, his resurrection). The activity of science is based on the presumption of the regularity, uni-

formity, and orderliness of natural events. So it might be presumed that scientists, if they believed in God, would find congenial a concept of God as the sustaining principle of the universe. That is to say, their theological position would stress the immanence of God in his creation. This stress could take place within the framework of orthodox Christian theism, or in any of several variations, like the scheme of process theology, in which the involvement of God within the emerging events of the cosmos is a prominent feature.

Is this presumption correct? Must scientists feel any tension between, on the one hand, God as personal and revealed in events, and on the other, God as sustaining principle of the universe? The acuteness with which the tension is felt depends, of course, in very large measure on the individual's personal experience.

For some scientists, and indeed many who weigh seriously the scientific perspective on the world, there is no such tension. Their theological positions, however derived, are independent of anything that science demonstrates. They do not believe a natural theology is possible or necessary – for various reasons which are not the same for all. It seems simply wrong to tailor theology to fit the predispositions of scientists.

Other scientists who believe in God experience this tension and live with it as part of the existential *Angst* in which Christians are involved. They do not attempt to resolve it by furter intellectual inquiry, believing that an irreducible level of tension is built into the Christian affirmations.

Yet other scientists who believe in God find it impossible to maintain in separate compartments their understanding of God with his action in the world, and their understanding of the natural world that they derive from the sciences. They wish to have a unified and integrated view in which they can see in one focus the God they worship as revealed in the biblical and Christian experience, and the God who creates and sustains the particular kind of universe which science unveils. These *do* feel this tension between the personal God who is revealed in events, and God as immanent and sustaining the universe.

Part of the problem of this third group of scientists is that, because of their training and temper of mind, they inevitably find themselves impelled to be skeptical about the historicity of supposed revelatory events, especially if these are thought to have involved some irregularity in the course of nature (as most of the biblical revelatory events seem, at least superficially, to have done). Such scientists, because they assume the regularity and uniformity of God's mode of immanent action in the universe, tend not to credit accounts of unique manifestations of God. But even after satisfying themselves on these historical questions, they would still need to integrate into a consistent whole the model of God which they derive from revelatory events, and the immanent, sustaining model of God which they derive from their contemplation of the natural world. For these scientists who wish to unify these two sources of their understanding of God, theology has a service to perform. It needs to develop a scheme and way of expressing Christian affirmations which will allow consonance and congruity between these two kinds of model. Then what God is believed to have been effecting in the Incarnation (i.e., in the whole life, death, resurrection, and ascension of Jesus) might be seen to relate in an integrated way with the immanent creative activity of God in the world. The two models indeed could then be mutually illuminating and mutually reinforcing as they develop a view of nature, man, and God which was unified within a particular framework of concepts and language. Attempts along these lines have been made, but not many; and those of us who come within this group of scientists who believe in God regard this as one of the major areas in which a re-thinking of theology in the light of science is urgent. More technically, the task could be formulated thus: to develop an understanding of God's action in the Incarnation which can be seen as a fulfilment of and as consistent with the understanding of God's ever-immanent activity in a creative process which the sciences now show to be the emergence through evolution of hierarchies of distinctive new structures, both human and non-human.

We recognize that not everyone would accept this task as formulated here. There are those who find the nature and purpose of theology so different from that of the sciences – to give illuminating perspectives, for example, rather than general theories – that they see the two disciplines as altogether different forms of discourse. And so underlying this whole proposed enterprise there is another question, basically a philosophical question, which is important to discuss further, namely, the relation between (a) methodology and criteria for decision-making in theology, and (b) methodology and criteria for decision in the natural sciences.

IV. TASKS FOR FUTURE THEOLOGICAL INVESTIGATION

In the course of the discussion at this conference many problems were raised which require further theological investigation, several of which have been cited above in the context in which they arose. The encounter with science represents a challenge to theology at the level of both doctrinal and ethical reflection. Views which are widely held in the churches are called into question. It is therefore essential that further studies take into account not only the theological opinions but also the beliefs actually held by the community of the Church. And, in the light of our increasing contacts with people of other faiths, it would also be illuminating to see how these questions are handled in other religious communities.

Some of the issues raised are the following:

(1) *The role of cosmological views in the Christian faith.* Does faith in Christ require a particular cosmological view? Or should theology refrain from developing comprehensive theological explanations of the cosmos? Where is the dividing line between comprehensive theological views and ideological systems with their tendency to become fixed and closed? In what sense do cosmological views contribute to the fullness of Christian witness and worship?

(2) *Rethinking theological methods.* In the light of science and scientific methods, how must methods of theological research be revised? What is theology's distinctive nature? By what ways are conclusions reached? What verification is possible? Is there a particular way of reaching agreement? (See the epistemological question at the end of section III above.)

(3) *Continuity and discontinuity between man and animals.* Christian theology has often stressed the distinctiveness of the human over against nature. Today great emphasis is placed on the common biological nature of human beings and animals and on the interdependence between man and nature as a whole. How should the relationship be stated to make clear both the responsibility of man for nature and the intrinsic value of nature? Is there a hierarchy of intrinsic values of organisms, and if so, what are the criteria for establishing it?

(4) *Stewardship of man and woman.* The image of humanity as steward is suggested by the biblical record: humanity entrusted by God with responsibility for creation. How is this theme to be developed today? In the past there has perhaps been a tendency to stress the call to master nature; and stewardship has mainly been described as the responsibility of each individual. What new problems and issues are implied in an interpretation of stewardship as collective responsibility for the future of the world?

(5) *Freedom of action or tragedy of life.* With the impact of science and technology on man and society, the question arises of the extent to which there is freedom to change the direction of future developments. Do human beings have the freedom to exercise the stewardship entrusted to them? How do we account for the destructive potential in all human decisions? How can we distinguish between the call to freedom and the acceptance of inevitability? Where is it the Church's task to challenge, and where to support, the consequences of development?

(6) *Sanctity of life.* In light of the interdependence between humanity and nature, how are the sanctity and value of human life to be evaluated? What are appropriate criteria of evaluation? At what points today do the life sciences most threaten Christian understanding of the sanctity of life?

(7) *What ways are there of re-directing technology?* If the distinction between technology as a tool and technology as a system is accepted, the question arises of how to achieve a society in which technology enhances the quality of human life and human community. This implies political and social decisions. How should they be reached?

(8) *The nature and role of the Christian community.* How can the Church, in its worship, in its teaching, in its pastoral counseling, in its public action, become more fully aware of the implications of the new situation between science and theology? How can scientific insights be appropriated by the Church? How can processes of decision-making be devised which preserve both the freedom of teaching and the possibility of public action?

LIST OF PARTICIPANTS

Dr. Paul ABRECHT
Church and Society
World Council of Churches
150, rte de Ferney
1211 Geneva 20, Switzerland

Prof. Rubem ALVES
Rua Frei Manoel da
Ressurreica 1439
(Guanabra)
13100 Campinas, SP, Brazil

Prof. Ian BARBOUR
Carleton College
Northfield, Minn. 55057, USA

Prof. L. Charles BIRCH
School of Biological Sciences
University of Sydney
Sydney, N.S.W. 2006, Australia

Prof. A. J. COLEMAN
Dept. of Mathematics
Jefferey Hall
Queen's University
Kingston, Ontario K7L 3V6
Canada

Prof. Thomas S. DERR
Smith College
Northampton, Mass. 01060, USA

Prof. André DUMAS
45, rue de Sèvres
75006 Paris, France

Prof. Bentley GLASS
Box 65
E. Setauket, N.Y. 11733, USA

Prof. Mary HESSE
University of Cambridge
Dept. of History and Philosophy
of Science
Free School Lane
Cambridge CB2 3RH, England

Dr. Kosuke KOYAMA
University of Otago
P.O. Box 56
Dunedin, New Zealand

Prof. J. M. LOCHMAN
Largitzenstrasse 62
4056 Basel, Switzerland

Prof. Nikos NISSIOTIS
Achilles St. 5
P. Faliron
Athens, Greece

Dr. Arthur PEACOCKE
Dean and Tutor
Clare College
Cambridge CB2 1TL, England

Dr. William G. POLLARD
Institute for Energy Analysis
P.O. Box 117
Oak Ridge, Tenn. 37830, USA

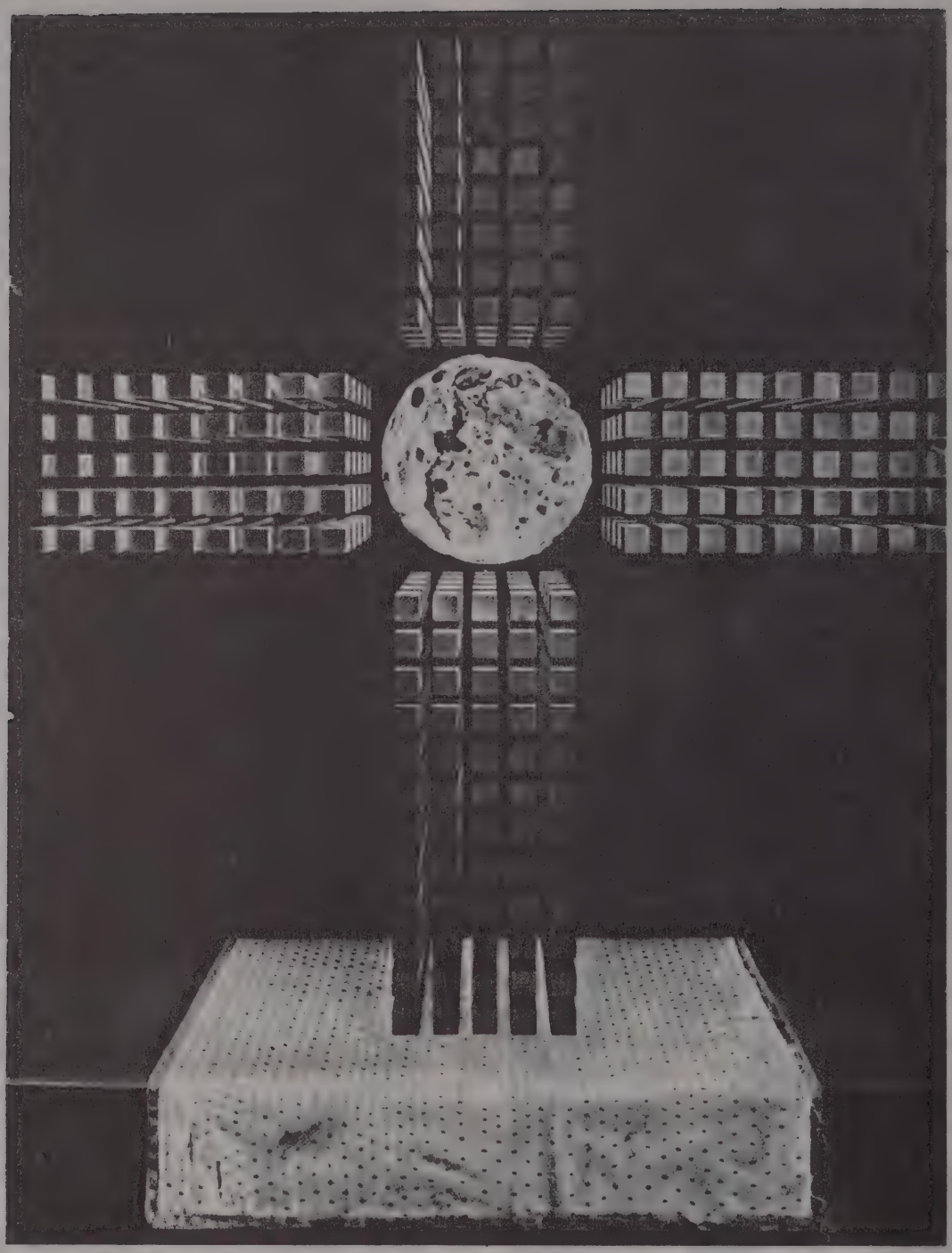
Mr. Peter SCHERHANS
Church and Society
World Council of Churches
150, rte de Ferney
1211 Geneva 20, Switzerland

Fr. Francisco VANDERHOFF
Centro de estudios ecuménicos
Fresnos 45, San Angel Inn
Mexico 20, D.F., Mexico

Dr. Lukas VISCHER
Commission on Faith and Order
World Council of Churches
150, rte de Ferney
1211 Geneva 20, Switzerland

Prof. G. R. WILLIAMS
Dept. of Biochemistry
University of Toronto
Toronto M5S 1A8, Canada

The Consultation was chaired by Prof. Jan Milic Lochman. Special thanks are due to Prof. Thomas S. Derr, both for his work of preparation and for editing the report.



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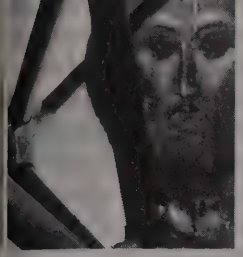


CONCEPTS OF CREATION AND SCIENTIFIC UNDERSTANDING

* *Mary Hess*

Faced with what he saw as the danger to society in the ascendency of natural science and decline in religion and morale, the great French sociologist Emile Durkheim sought the origins of both religion and science in their function in primitive societies as guarantors of social solidarity. In contrast to Frazer, Tylor, and other early anthropologists, he looked for the internal intelligibility of myth and ritual in social terms, rather than regarding them just as failed attempts to state objective truths about the natural world of the same kind as those later arrived at by natural science. One does not have to accept Durkheim's ultimately atheistic identification of God with Society, nor the politically authoritarian consequences which have sometimes been held to follow from this identification, to see that Durkheim has raised a set of issues of crucial importance for a discussion of science and the myths and doctrines of creation. For what he has done is to reintroduce a third factor into the perennial and by now rather frustrating dichotomy between science and religion, namely society and the sciences of man. It is the consequences of this approach that I want to explore in this paper.

I shall begin by retracing some familiar ground: how the dichotomy between science and religion became fixed during the 17th century scientific revolution; how natural science came to be seen as the epitome of objective knowledge, and consequently acquired a monopoly of the understanding of value-neutral truth; and how this has led to two extreme views to be found in current philosophical theology: either that theology is metaphysical and meaningless, or that its meaning and truth are defined internally in a certain sort of language-game which is one among many possible such games whose cognitive criteria are mutually independent. Then I shall consider some current critiques of the scientific notion of 'truth' presupposed in both these views, and ask how it is affected by the growing epistemological importance of the human sciences. By interpreting certain aspects of these sciences as value-laden ideologies, I shall consider how far Christian theology can also be undertood as an ideology, and, by way of example, oppose its interpretation of the nature and destiny of man to those of two other influentia modern systems to be found in the works of Jacques Monod and Louis Althusser.

The 'new way of philosophising' that yielded the scientific revolution of the 17th century was the heir of two traditions which have remained in increasing though partly disguised tension ever since. These were on the one hand the tradition of rational cosmology inherited from Greek science, from which came the theoretical framework of the new science, and on the other hand the practical traditions of crasftsmen, navigators, metallurgists and alchemists, from which came the concept of experimental test and the hope of technical control of nature. As Francis Bacon expressed it at the beginning of this scientific movement: '... *the matter in hand is no mere felicity of speculation, but the real business and fortunes of the human race, and all power of operation... And so those twin objects, human Knowledge and human Power, do really meet in one; and it is from ignorance of causes that operation fails*'.

From the beginning this dual inheritance exposed science to conflicting criteria. Cosmology, in its Aristotalian form, was until the Copernican revolution an expression of a world view. In the form in which it had been Christianized by Aquinas, it expressed a view of man as the crown of creation, playing out the drama of history and redemption on the stable stage of the earth-central universe, round which revolved other globes, conferring upon the earth and upon man benefits of light, heat, and perhaps astral influence. The traditional alternative cosmology was the acentred universe of chance configuration of atoms moving arbitrarily in space, and this was generally rejected as chaotic, atheistic and morally degenerate. The accepted cosmology was therefore, in something like Durkheim's sense, part of an integrated system in terms of which man understood himself, his society and his history.

The new emphasis on empirical test was bound to come into conflict with this function of cosmology. Empiricism introduced a new notion of truth and knowledge, in terms of which science was understood to have the aim of 'reflecting' an external world which was 'distanced' from man, and in principle wholly independent of him. The aim of science was now to uncover 'the facts' irrespective of their consequences for man's value-system and view of himself and society. Theological and moral arguments for and against particular aspects of scientific theory began to be held to be irrelevant, although these arguments still played an important role in early 17th century science, for example in the rejection of astrology, which was held to be in conflict with man's freedom as guaranteed by Christian revelation, and the rejection of theological explanations in science, which were distinguished by Bacon as the province of theology, not science: first causes, he said, are like virgins dedicated to god, and therefore barren of empirical fruit for the good of men. What has variously been called the 'disenchantment' of the world (Max Weber), and the 'dissociation of sensibility' (T.S. Elliot) became the presupposition of science. And not only of science, for the new concept of objective value-free scientific truth began to be transferred also to those aspects of theology that impinged upon the subject-matter of science: cosmology, the history of the earth and of biological species, the nature of life, mind and soul, and the alleged providential activity of the divine in human affairs. Not surprisingly, since this concept had originated with and was tailor-made to fit scientific knowledge, it caused difficulties when applied as a measure of theological assertion. The details of various tedious and ultimately self-stultifying conflicts between science and religion do not need rehearsing here. The upshot in modern philosophy of science and religion has been twofold: first the positivist reaction which rejects **all** assertion not subject to scientific test as 'meaningless' or at least not cognitively valid, not related to knowledge or truth; and second, the reaction of the later Wittgenstein and his followers, who postulate a multiplicity of 'truths', valid in different and independent language-games, each integral to different 'forms of life', neither

* Prof. Mary Hesse is Professor of Philosophy of Science at the University of Cambridge, U.K.

Salvador Dali said of his painting "The Nuclear Cross" (opposite) "that a mystic link must sooner or later bind our scientific discoveries... to religious concepts."

impinging on nor conflicting with each other, and between which no judgments of relative validity can be made. The first of these reactions is perhaps more bracing for theology, as involving open challenge to the right of theology to exist at all as a cognitive discipline. The second has encouraged an all too prevalent temptation towards a ghetto mentality among the religious, who are allowed in its terms to play their own games as long as their form of life does not intersect with that of the secular, scientific world.

II

Both philosophical responses have altogether lost touch with the social insights to which Durkheim directed attention. It is still something like bad form in philosophical contexts in the English-speaking world to draw the conclusion that the original concepts of truth and knowledge which science began to exploit in the 17th century are the source of the trouble, and are not necessary and parennial concepts of truth and knowledge. However, at this point the pursuit of scientific and philosophical argument in its own terms has come to the rescue. For these very concepts of truth and knowledge are now under severe attack from many directions. One of the first sources of attack was the study of the anthropology of belief systems to which Durkheim himself contributed. At first, Frazer, Tylor, John Burnett on the Pre-Socratic, and many others, naturally judged these belief systems against scientific criteria, and found them to the simply false. But soon the interconnections of cosmology, myth, ritual, and social, economic and technical arrangements came to be seen as systematic parts of an integrated whole, for which external criteria of **scientific** truth and falsity were not directly relevant. 'Truth within a belief system' came to be a richer concept than mere reflection of facts in empirically testable propositions. A similar understanding of truth has also become relevant in many other disciplines: the history of ideas, seen as the study of belief systems in 'rational' as well as so-called 'primitive' societies; the sociology of knowledge, as a study of the correlations of beliefs and social systems; and finally, within the paradigm of knowledge itself, the history of natural science, which has been interpreted by Thomas Kuhn and others as a sequence of systems of internally related concepts, metaphysics and theories, in which the aspect of verification and falsification by empirical test is claimed to have only minimal effect upon the theoretical explanations that science from time to time puts forward as 'true'.

Since this last attack upon traditional theories of truth has breached the citadel of empiricist knowledge itself, it has received rather more philosophical attention than the other examples I have given. Let me briefly outline its consequences for our understanding of the truth of science. The key lies in the 17th century conflict between theory and empiricism. On the one hand the cosmological urge to describe the essence of nature yielded a multiplicity of highly sophisticated theories purporting to reveal hidden entities and processes as the real causes of all natural phenomena. On the other hand it was the desire that these theoretical explanations should increasingly approximate to universal truths which, unlike all previous non-empirical cosmological systems, would never be overthrown by subsequent developments. Tensions soon arose between these theoretical and empirical aspects of the new science, primarily for the single reason that no amount of empirical investigation can guarantee the truth of a theory, since this always goes beyond the limits of observable experience in size or time or place. And since the truth of theory can never be guaranteed, there is always a multiplicity of theories that will fit the facts more or less well, whose credentials will rise and fall with culturally accepted norms as well as with experimental developments, and which will each in all probability eventually be refuted and rejected from serious scientific consideration. No reflective scientist is likely to deny that the way science conceives the fundamental nature of things at any given time will be very different in subsequent science (that is to say, if science survives long enough), and that the way in which fundamental theories change is not by progressive approximation to stable truth, but in a series of radical revolutions in our views of space, time, matter, and the origins of the universe. The further theories get from observable facts, the more they are **underdetermined** by the facts, leaving open a multiplicity of theoretical interpretations.

Carefully stated, I believe this conclusion is both inescapable, and also that it constitutes a definitive refutation of the 17th century ideal of science, and hence of its concepts of empirical knowledge and truth. One apparent difficulty must first be dealt with. There is often resistance to accepting the conclusion on the grounds that science quite clearly is in some sense a progressive and not a constantly revolutionary enterprise. After all, it is held, science is a system of continously accumulating knowledge. We have learnt a great deal about the world which we exploit in scientific technology. Knowledge is power; we have learned and therefore can control. Of course this is true. But far from entailing rejection of the conclusion regarding **theoretical** science, this progressive character of science rather shows us how the peculiar kind of knowledge attainable by science should be understood and distinguished from theoretical knowledge. It is the kind of knowledge precisely appropriate to prediction and control; it is what is learned by an organism which attempts to adapt to and change its environment by gathering data in experimental situations, processing the information gained, and learning to predict successfully further developments in the environment and the subsequent effects of its own actions. It is not the kind of knowledge that yields truth about the essential nature of things, the significance of its own place in the universe, or how it should conduct its life.

Two further questions immediately arise. First, if theoretical explanation is not determined by this instrumental aspect of science, what is its significance? And, secondly, must we now revive the notion of a non-empirical metaphysics in the attempt to answer the non-empirical questions, where metaphysics, and perhaps particular scientific theories too, are subject to their own criteria of truth different from the instrumental truth of successful prediction and control? The questions are related, and I believe the key to both of them is to be found in the sociological rather than the purely metaphysical realm. Or rather, I believe that the Marxists and Durkheim are both right in seeing metaphysics itself as intrinsically related to social life, and not subject to independent, perennial, criteria of truth, although some Marxists may be wrong in seeing this relation as unidirectional from substructure to ideological superstructure. It is rather, as other Marxists will agree, a mutual and reciprocal interaction.

All this may seem a far cry from the specific question of concepts of creation, so let me illustrate by considering the present state of scientific cosmology. In taking this example I am not of course presupposing that Christian doctrines of creation are concerned only with temporal origins and the large-scale structure of the universe. Many other aspects of natural science are *prima facie* candidates for consideration – particularly those reductionist aspects of biology and psychology that seem to come into conflict with views of man as free agent in his individual, social, and historical life, in which he, and indeed the non-human world also, are held to be open to the personal, and therefore non-lawlike, activity of God. I shall return to some of these issues in section IV below.

Of all physical theories, cosmological theories of 'model universes' are most obviously highly underdetermined by the facts. Modern cosmology originates with Einstein's general theory of relativity, which is a theory of the deformation of space curvature by the distribution throughout the universe of mass-energy. The equations of this theory permit a solution predicting that the universe is expanding, and this prediction seems to be confirmed by the already observed 'red shift' of the stellar galaxies, which sug-

gests that they are receding from us in all directions with a velocity increasing with their distance. Two consequences follow in this model with regard to space and time. First, when the distance becomes so great that the velocity of recession reaches the velocity of light, galaxies become invisible to us, and hence there is a limit to the size of at least the observable universe. Second, extrapolating backwards in time, there was a time at which all matter was together in a very dense region of space, under physical conditions that we cannot imagine or hope to describe with certainty, and beyond which further extrapolation back in time is so speculative as to be practically unguided by any conceivable experimental evidence. The latest estimates for the date of this 'origin' of the universe as we know it is given in 'big bang' models as about 10 thousand million years ago.

There are many alternative model universes in scientific cosmology, all more or less fitting the facts as we know them from our very limited observations in space and time, and between which further observational tests are sometimes possible but never anything like decisive. The best known rival to the 'big bang' theory has been the 'steady state' theory, which caused some mistaken theological excitement when it was first proposed, because it postulated a continuous creation of hydrogen atoms throughout space, thus replenishing the total matter-energy of the observable universe to balance the receding matter disappearing beyond the light horizon, and maintaining an overall homogeneity of distribution of matter throughout space and time without the singular origin point of indefinitely high density. But the latest evidence seems to count decisively against this model. There are also models involving periodic expansions and contractions of the universe, which may have the curious consequence that time goes backwards in phases of contraction relative to the forward time of our phase of expansion.

But though science fiction sometimes seems to have taken the place of religious myth in our society, neither serious cosmology nor science fiction is theology, and several important points need to be made about the significance of these cosmological models. First, as I have said, they are so severely underdetermined by anything we can observe, that it is inconceivable that we shall ever reach by normal scientific means a definitely true theory of the physical structure and history of the universe as a whole. Second, although sometimes particular models can be tested against observation and at least tentatively rejected as inconsistent, much the most important kind of criterion for the acceptability of such models is mathematical: models have to have a certain degree of mathematical simplicity to be manageable at all, and there are also other quasi-aesthetic criteria for the goodness of a mathematical model which have little to do with empirical fact.

Thirdly, criteria for the goodness of a model definitely do not, in present-day cosmology, include anything that could be called theological. This is a fact about acceptable physics in our scientific society, and it means that cosmological models have no relevance to theological doctrine. Doctrine does not interact with cosmology, even in the sense of being a source of imaginative hypotheses. This of course has not always been so – for both Aristotle and Newton theology was a source of scientific hypotheses – and it may not always be so in the future, but if there is to be a change of scientific practice in this respect, there will have to be a radical change with regard to the admissibility of non-natural, or at any rate non-physical, entities. God was abandoned by Laplace as an astronomical hypothesis, not necessarily because Laplace was an atheist, but because introduction of a *deus ex machina* put a stop to testable science – such a God could produce any effects, and his presence or absence in particular effects could therefore not be verified or falsified by any empirical test. Moreover, theology would gain nothing by such reintroduction of the God-hypothesis, for it, like all speculations that suggest new scientific theories, would be subject to the fluctuations of scientific fashion, as for example the hypothesis of atomism has been.

The fourth point to notice is that there is in our society little influence of physical cosmology upon social ideology or mythology. The social and to some extent the biological sciences are now much more fruitful sources of meaning for man's understanding of his status in the world. The reasons for this are complex, dating back to the origins of biology and social science in the 19th century, and certainly including the new understanding of the significance of the physical sciences that I have been describing. Whatever these reasons may be, they have the consequence that attempts to derive support for or refutation of theological doctrines from physics will appear in our social climate to be as irrelevant as corresponding moves with respect to any other ideology would be. This is not to deny that there is quite profound science fiction that uses cosmology in the interests of theological, sociological, and psychological insights, as for instance in the films '2001', and the Russian 'Solaris'. But the point is that these insights come from quite other sources than physical science. What, then, are these sources?

So far I have suggested that sources of meaning are not to be found in the kind of metaphysical systems which were thought to share a univocal concept of truth with science. Scientific truth gives us a world set objectively over against us, indifferent to man's purpose, which, if we accept the discipline of detaches experimental investigation, we can instrumentally control. There is indeed such a world (I do not wish to advocate any species of philosophical idealism), but the scientific truth about it does not even penetrate to the scientific theories we need to manipulate it, much less does it reveal to us its essence. If we are to understand its meaning we must put ourselves, individually and corporately, back into the picture. But a word of warning here. In theological contexts what I have just said may appear neither startling nor controversial. We are accustomed to hearing that 'theological truth is not propositional' but has to do with commitment, trust, etc. But it cannot be too strongly emphasized that **nothing** that has been said in the English-language theological literature has begun to come to grips with this problem of truth on a level of intellectual rigour that matches the English-language philosophical literature. I know this seems a harsh verdict, but whatever has been done in the German and French languages within **their** philosophical traditions, however accurate the translation of this into English, is not a sufficient contribution to the English philosophical debate. Christian theologians of all people reject at their peril their incarnation within their own natural language and philosophical tradition.

In the nature of the case I am not going to be able to do more than scratch the surface of this problem. There are, I think, two directions in which we can look for aid. The first is in the sciences of man themselves, which find themselves in a very similar dilemma: their attempts to extend the methods of natural science into their own domain seem to be breaking down, and on the other hand it is very unclear what sort of 'truth' about men and society should take the place of the objectivity of natural science. And second, and more obviously relevant to Christian theology, current crises in man's understanding of himself have thrust forward ideologies that clearly compete with the Christian understanding of man and his history, so that for the first time for several decades there is serious intellectual concern with theological questions that are being asked and answered on levels that are ideological rather than scientific.

III

The view of the natural sciences that I have been presenting has two characteristics that are relevant in a comparison with the social sciences. First, the criterion of success and hence of truth in natural science is success in prediction and control. Second, their fundamental theories or conceptual frameworks cannot be

interpreted as attempts at realistic description of the hidden features of the external world, but rather as particular view-points upon the world, partially determined by interests other than predictive truth. Not only do the theories themselves come and go, but so do the interests they serve: in one culture they may be theological and metaphysical, in others sociological, and in others (ours) the acceptability of many physical theories can be fully understood only in terms of internal aesthetic criteria. When the project was first conceived of extending the successful methods of the natural sciences to the sciences of man, that is in the 19th century, it was inevitable that the truth-criteria for social theory should be soon as identical with those for natural theory. In the then current **mis**understanding of the purpose of natural science, it followed that the search for social theory should become a search for objective, value-neutral, descriptive laws and explanations, in terms of which the primary subject of the social sciences, man, has to be seen as a purely natural phenomenon, identified solely in terms of observable products: behaviour, language, codified laws and customs, and the means and forces of economic production.

The project was a radical break with all previous theories of man and society, which had been heavily dependent on value-laden interpretations of man's place in the cosmos, and the relative significance of the individual and society. Also the project was unrealisable. Whether it was unrealisable in practice because of the extreme complexity and rapidly changing character of the subject-matter, or whether it is unrealisable in principle because of fundamental difference between nature and man as subjects of investigation, is a dispute that has gone on rather inconclusively for 100 years. But whatever may be thought of that debate, its terms of reference have now been shifted to a different level as a result of the new and clarified view of the natural sciences I have just outlined. For consider what happens if we apply the two characteristics of natural science as now understood to the social sciences on the assumption that the two kinds of science should be essentially the same. First, the aim of the social sciences becomes success in instrumental prediction and control. Second, the theories of the social sciences, which are certainly as underdetermined as those of the natural sciences if not more so, need determining criteria other than the instrumental, and these may come from the same theological, metaphysical and ideological sources as those of natural science throughout much of its history. Aesthetic mathematical criteria are unlikely to be relevant, since social theories are unlikely ever to be structured in as much mathematical detail as those of physics, but a new source of criteria should perhaps be added, namely the introspectively psychological – what Dilthey and Weber called the method of *verstehen,* or understanding of human meaning as it were from the inside.

Recognition of these necessary features of social science theory carried us far from the notion of objectified true description of a dehumanized external world which in 19th century empiricism were the goal of natural and social science alike. And consideration of the first characteristic of natural science, the criterion of successful prediction and control, raises questions in relation to the social sciences which have not been thought to arise for the natural sciences until very recently. **Ought** the aim of social science to be primarily prediction and control? Put like this, it becomes clear that an affirmative answer is itself a value judgment of very great importance for the project of a social science. Conflicts between social engineering and traditional political wisdom, between computerised systems-theories and theories that interpret man's place in society and history humanistically, immediately suggest themselves, and between these conflicting views of what a social science should be, value decisions will necessarily have to be made, and theological judgments, whether they are explicitly present or absent, will most certainly be relevant.

Perhaps fortunately for theology, this is becoming all the clearer because the attempt to produce value-neutral social science is increasingly being abandoned as at best unrealisable, and at worst self-deceptive, and is being replaced by social sciences based on explicit ideologies, or at least on explicit points of view related to particular interests in society. Some of these have atheistic and dehumanizing consequences that are bound to conflict with a Christian understanding of man and society. I shall devote the rest of this paper to describing two of them both deriving, as it happens, directly and indirectly from French Marxism. I do not wish to claim that these two examples are by any means typical of viewpoints taken up in social science theory, particularly in the English-speaking world, but to study some extreme cases may help better to elucidate the nature of the potential conflicts.

IV

My first example is the French molecular biologist Jacques Monod, and in particular his book *Chance and Necessity.* Monod is an ex-Marxist, who has returned from that largely non-scientific ideology to something much nearer to old-fashioned scientific humanism, but with a new and explicit recognition that this in itself involves non-scientific judgments of value and meaning. the attempts to show that modern evolutionary biology provides both an acceptable and comprehensive explanation of the origin and development of man and society, and that it is incompatible with any view of the universe as permeated by purposes relevant to human life, and to any view of man as the centre and purpose of the universe. Marxism as well as Christianity is an example of what he calls these 'animist' assumptions, since it, like Christianity, postulates the presence of purposes in history. Monod's basic premise is what he calls the 'principle of objectivity', that is, that only scientific knowledge counts as real knowledge, and he bases this on the level of instrumental control that science has made possible. Biological knowledge in particular, he claims, is now sufficiently established to make it certain that the development of living matter and its reproductive mechanism, and the diversification of species by mutation and natural selection, are entirely governed by the operations of **change** upon simpler primary. Thus, although complex organisms like higher mammals and man exhibit behaviour that only be described in terms of their having purposes for their own life, this behavious is entirely parasitic on the reproductive mechanisms that ensure the survival of invariant forms of the species in successive individuals. The development of these mechanisms is wholly explicable by change, without postulating any suprahuman purpose immanent in nature. Biology has shown, then, that purpose is parasitic upon change, whereas all 'animist' ideologies presuppose that purpose is primary, and even that it determines the forms of organic life. This refutation of animism, Monod goes on, explains the deep malaise of modern man, who is bereft of the value systems that used to seem objectively supported by suprahuman purposes. Man finds himself alone in the universe, the only source of his own values and purposes, just at the time when science has given him unprecedented power to control his own environment and his history.

So much for Monod's argument. It culminates in almost moving and dignified presentation of man's dilemma, and Monod's conclusion, for which he explicitly does not claim scientific backing, is that the very practice of science itself demands moral decision, and is itself based on what he calls an 'ethic of objectivity'. This ethic is perhaps sufficient to replace the old ethics of animism: 'the ethic of knowledge that created the modern world is the only ethic compatible with it, the only one capable, once understood and acceptable, of guiding its evolution' (p. 164). But can it calm the fear of solitude, satisfy the deep genetic need for an explanation in which man is at home in the universe? Monod goes on:

I do not know. But it may not be altogether impossible. Perhaps even more than an 'explanation' which the ethic of knowledge cannot

supply, man needs to rise above himself, to find transcendence... No system of values can claim to constitute a true ethic unless it proposes an ideal transcending the individual self to the point even of justifying self-sacrifice if need be (p. 164-5).

Many technical scientific and philosophical objections can be made to Monod's thesis which there is no room to develop here. What I want particularly to draw attention to, however, is first the level of argument upon which theological debate with Monod must be carried out, that is a level at least as scientifically informed and philosophically honest as his own, and second, that the debate is primarily and specifically one about values and action – how are we to live, given that the universe apparently answers to none of our aspirations and grounds none of our interpretations of ourselves and our significance? To reply to this thesis in terms of the theological categories of God, creation, providence, incarnation, and the rest, is not to debate about mere happenings or factual truths, or about theoretical speculations, but about meanings and values whose ultimate sanction, as Monod recognises very well, must be of the kind 'here stand I, I can do no other', or perhaps 'Thus saith the Lord...'. But this does not mean a dogmatic reassertion of esoteric theological propositions, but a reaffirmation of insights which open out from where Monod and other secular men themselves actually stand.

If Monod's is an ideology of *chance,* my next example is an ideology of determinism. This is taken from Monod's colleague, the French hardline Marxist Louis Althusser. The writings of Althusser and his associates form a comprehensive philosophical corpus beside which the reflections of the scientist Monod are slight indeed. It must be confessed, moreover, that modern French philosophical idiom is far removed from Cartesian transparency, and is particularly opaque to English eyes; it is therefore difficult to be sure that one has fully understood its implications. With that caveat however, I shall try to give a brief summary of Althusser's explicit discussion and rejection of the Christian view of man. I should first explain that Althusser uses the term 'ideology', as I have also been using it, to denote the theological or philosophical, political and social superstucture which he claims must accompany **every** economic system, including the socialist system. Thus 'ideology' is not in his view, as in many other Marxist and non-Marxist writers, a necessarily pejorative term denoting the **distorted** perspective of ideas that accompanies only imperfect social systems. It needs only to be carefully distinguished from what Althusser takes to be hard science, in a way similar to, but not identified with, the way I have distinguished the theoretical from the instrumental.

According to Althusser, the feature of Christian ideology that has persisted through the Enlightenment to modern secular philosophy and through feudalism to capitalits and post-capitalist economics, is the myth that God addresses men 'by name', as free individuals who in some sense initiate and are responsible for their own actions. God reveals himself to men in this myth as does the author of a book to his readers: the world is a book in which we can read God's nature and his will; the world is objectified and distanced from men precisely because it is God's creation into which men have been placed as independent agents. This is the real ground of the possibility of objective natural science as understood since the 17th century. In this sense the concept of 'man' presupposes the concept of God, and as Althusser's former pupil Michel Foucault develops the idea, the death of God is at the same time the end of man: it is 'the last man who announces that he has killed God' *(The Order of Things).*

So far Christians may find little to quarrel with in this interpretation. However, the next step is more radical. It is claimed that a necessary book has now occurred in the epistemological tradition, as a result of the development of the sciences themselves. The most characteristic feature of theories accepted in all sciences is that they remove man from the centre of the universe. This was true of Copernican astronomy, in that man is no longer at the geographical centre; it is true of Marxian economics, where man is no longer the determining agent of his destiny; of Freudian psychology, where the ego is no longer the free centre of the self; and of modern linguistics, where even language makes man rather then man language. The consequent dehumanization of the world is very similar to the consequence drawn by Monod; but where Monod sounds a challenge to existential decision is this situation, Althusser and his colleagues ask only for 'correct' thinking relecting 'correct' action, and both of these are determined by the structure of relatively transitory events as revealed by scientific theory. In this interpretation Marx is even deprived of his surrogate for divine providence: the inevitable march of history to some kind of social goal. There is instead only the passing scene with men caught up in the criss-cross of locally structured determinations.

Not only Christian but also secular philosophers and scientists have many resources for an intellectual critique of this position. I use it only as an example to raise questions that I cannot pursue here. But since it aspires to be a more or less coherent unity of theory and practice, two conditions must be binding upon any critique. First, the position cannot be dismissed purely as crude and out-of-date materialist philosophy, because ideologies of theory and practice have a more complex hold on men than the purely intellectual. And secondly, ideology must be confronted with ideology. This will mean rethinking and restating Christian theology, not for the first time in its history, so as to confront modern heresy, not the heresy of the Greeks, nor of Islam, nor of the Enlightenment humanists.

V

Let me try to draw the threads together by summarising what seen to me to be some concrete consequences for theology, and particularly for doctrines of creation.

The most important consequence is that the concept of 'truth' in theology, as also in much of social science, must be detached from the old empiricism of natural science. The truths of theology assert judgements of meaning and value which need to be made explicit to prevent confusion with the concept of merely factural truth. This is not so much in contradiction with the empiricist dualism of 'is' and 'ought', as a recognition that assertions merely of instrumental truth are not sufficient even for the construction of a theoretical science, let alone an account of God, man, and the universe.

There are two ways in which this conclusion may seem to have disturbing consequences for theologians. First, since it is based partly on reinterpretation of the notion of theory in the social sciences, it may seem that it requires theology to be constrained within the social and ideological patterns of a given society. If this were a necessary consequence, then any view of theology leading to it should rightly be rejected. But it is not a necessary consequence, for the patterns of every society, certainly every advanced society, are complex overlappings of different influences and interpretations, some newly arising from new local social conditions, but some arising from history and tradition, and some from interactions with contemporary but culturally distinct societies. It is not that theology must reflect the implicit ideological judgments of our society, for there is no one consistent set of such judgments, but that it should arise out of and address itself to the real conditions of our society – it should be and be seen to be one of the **possible** expressions of our society, and not, as so often now, a visible expression of archaism. This does not mean, of course, that it cannot depend at all on history or tradition or on the insight of other societies, for our society itself depends on these, perhaps far more profoundly that we may think. We need to discern the signs of the times in order to distinguish archaism and the merely esoteric from living tradition.

Secondly, should theologians be alarmed at the apparent rejection of the notion of perennial truths of which he has often been regarded as guardian? Again I do not think so. It may be that we shall have to abandon hope of expressing theological judgments in linguistic forms which, in the best translations, are claimed to be perennially valid. But this is not a surprising concession to have to make to cultural relativity: after all, language itself is heavily impregnated with changing ideologies, and even the language of physical theories is no longer claimed to be cultural invariant. It does not at all follow that perennial truth of the proper theological kind cannot be captured, however fleetingly and obscurely, in the appropriate expressions of each culture, any more than it follows that the linguistic variance of physical theories prevents the 'truth' that underlies instrumental control of nature having objective and perennial character. Care must be taken not to misunderstand this analogy – it is not intended to suggest a similarity in the notions of 'truth' in theological and instrumental contexts, but only that truth of whatever appropriate kind does not have to have invariant linguistic expression in order to be itself valid and perennial. If theological truth is conceived as valid and perennial, then no alarm need be caused by its transitory expression in different societies, for it will presumably follow from the nature of this theological truth that every society will reveal aspects of it, either positively or negatively, perhaps even through what may be called 'God-shaped vacua', the society appears to be committed to no positive theological expressions at all. There is of course no guarantee that theologians always discern or succeed in expressing the theological truth that should be spoken through their society, and there are no conclusive tests of success here, but such uncertainty is part of the price men pay for anything that deserves to be called knowledge.

What I have said about the nature of theological truth is but a programme for study by philosophers of religion – perhaps the most important intellectual task now facing the Church. They will have to consider also the nature of the constraints upon and criteria for 'goodness' of theological assertion. All I can say now is that I believe these will lie primarily in the areas of meaning and value judgment, and not in the area of empirical fact. This has the negative consequence that theological assertions that have been thought to impige upon empirical fact and hence upon natural science, such as doctrine of creation and providence, are very little related to natural sciences as now understood. Theologians should not, therefore, be over-concerned with the state of physical cosmology, or even with reductionist biology, except where these are being used illicitly (as sometimes, for example, by Monod) to support philosophical positions that themselves must be rejected from a Christian standpoint. There is also a positive aspect to the relation of modern physic and biology to ideology and theology but it should be seen rather in the freeing of the imagination in the ways exploited by science fiction, than as constraining man's interpretations of himself in conformity with any one of the changing theories of natural science.

Some current challenges to Christian theology are also challenges to materialist and reductionist ideologies, and they go very deep. Can we, for example, retain the concept of man as a free and partly non-natural agent in the absence of a concept of God? If not, are Christians committed to reintroduction of some explicit moral and theological categories into the sciences of man? We are at least committed to reconsideration of many sacred scientific cows such as the indefinite possibility of natural knowledge and control, and the moral and political neutrality of science. Again what should be the practical (that is to say, moral and political) stance of such theological reinterpretation? Some of the points I have made may seem to align Christian theology too closely with a libertarian and individualist view of man – an ideology that has been associated with religiously unfashionable Western *laisser faire* faire capitalism. But these are complex issues, in which there is no simple correlation between ideological positions and stereotyped right and left in the decisions of everyday politics. At least it surely ought not to be presupposed, as it often is now, that of all current moral and political issues this stance should be effectively indistinguishable from a certain near-Marxist socialism, so that what *New Statesman* says on Fridays is reproduced by progressive churchmen on Sunday, or what the Third World says today, will be found issuing from some committee of the World Council of Churches next month.

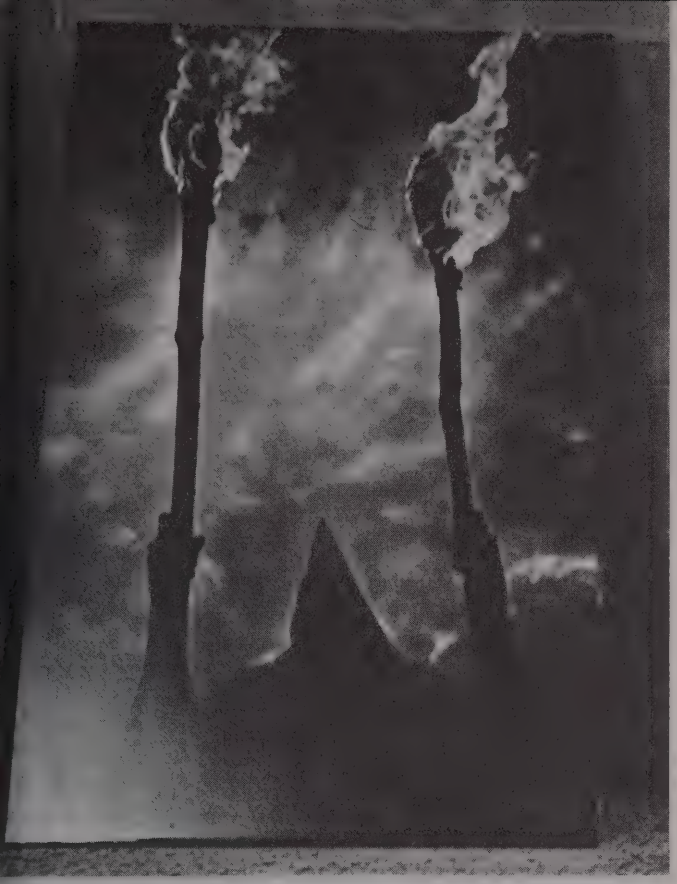
I leave these controversies quite open-ended, partly because it is not for me to pronounce on specifically theological consequences, but also because I believe we are in an essentially open ended situation. We have not begun seriously to address ourselves to these questions in any deeply rethought theological context. To adapt Kant's aphorism, theology without practice may be empty but practice without theology is blind, and at present we have too much of the latter. Doubtless we shall not all agree on answers to the questions I have posed and on many others. Bitter theological disputes may well break out again, but this will be sign of health because it will show theology being again incarnated in its own time, and even perhaps differently in each of the many and deeply distinct social systems of our time. We shall not create the successors of Augustine and Aquinas overnight, but if we are faithful to our own concerns, in his own good time God may.

EVALUATION OF THE ECUMENICAL ENCOUNTER BETWEEN THEOLOGIANS AND SCIENTISTS

* *André Dumas*

I. Mutual Indifference

The scientist appears to me as the third man in World Council of Churches meetings. There was of course the first man, brought in through what is called Faith and Order, to work for the unity of the Body of Christ and the People of God. Schematically one can say that his work began with comparative theology of diverse confessions; it continued with the elaboration of an ecumenical ecclesiology as a result of the spring-time in relations between the Council in Geneva and the Council in Rome; and now it bears on the confession of the faith and the hope which Christians have for our present world. The whole World Council lives from this first task with its successive stages. But, whatever the reason, whether it was a certain stagnation in the bringing together of dogma, or a felt need not to make the world wait on the slow progress of ecclesiology, what I would call a second man soon appeared, the man of social, economic and political commitment. He worked in the movement which was first called Life and Work and which



then became the World Council Department on Church and Society. This change of name is symptomatic because this second man was, because of his origins, at first occupied with the social gospel, whether immanent or transcendant, evolving or eschatological. Then the period of the totalitarianisms led him to examine the classical and newly urgent question of the relation between church and state. Finally during the last twenty years he turned to the global society – its social and technical revolutions (the Geneva Conference of 1966); to its limits, its world equilibrium and necessary autonomies (the Bucharest Conference of 1974); – asking the question of the relation between revolution and equilibrium, between social justice and technological capacity, and between solidarity and autarchy. This second ecumenical man has also therefore like the first man experienced different stages, the recollection of which can help us understand the creative, incomplete and sometimes chaotic discontinuity of our recent history.

But I have not spoken of these first two ecumenical men only in order to create the necessary suspense for the appearance of the third, the man of science. Let us be frank: he had hardly any desire to associate with the first two men until very recently. The man of the church appeared to him as an anachronistic and often unfortunate being, still bound to the claims of an authoritarian revelation, of a subjective and unverifiable supernatural while he (the man of science) practiced a tolerant observation of an objective and experimentable nature. Outside of its possible function of providing an ultimate synthesis of the real, religion appeared to him difficult to distinguish from superstition about supernatural causalities, and based on the emotionality characteristic of fervor rather than the rigour of understanding. In relation to this congenital distrust between revealed faith and a humanly constructed science, let us note that the man of science also distrusted the political man, his partisan passions and his demagogic manipulations. He no doubt appeared to him as a deplorable modern offspring at the level of political parties, of him who had been his tough adversary in former times, the man of the church. There was therefore a serious scientific resolve not to associate with the two men, the ecclesiastic and the socio-politician, who as I have indicated, had constituted the two pillars of the ecumenical movement since its beginning.

But it is necessary to see also that theology itself had no desire to come into too close contact with various sciences. I speak here from a very limited perspective, that of European protestantism which lived in the shadow of two fathers of contemporary philosophy, Kant and Hegel, just as the patristic fathers had to live in the shadow of Plato before the scholastics substituted Aristotle for him. The major fact which concerns us is that theological tradition since the beginning of the 19th century had had more advantage under the influence of Kant and of his rigorous distinction between knowledge and belief, between understanding and reason, than it did under the influence of Hegel and his encyclopedic attempt to realise an absolute knowledge which comprehended nature and consciousness, history and reason, the becoming of man and the becoming of God. Theologically, the teaching of Kant appeared more prudent and convincing than the ambition of Hegel. It wanted to say that we must above all not confound two very distinct realms: on the one hand, the realm of facts, with informational, empirical exteriority, permitting the use of categories of logic characteristic of all human understanding. Causality ruled here, permitting knowledge and understanding of the facts, which Kant called 'statutaires', that is to say that, which was held as the basis of things. But Kant was opposed to all scientism, noting also that we would find no absolute in the realm of the truly scientific. And on the other hand there was the realm of ideas, of significance and of values, with their transcendental exteriority, where we could not clearly find any knowledge, but where it was not forbidden to believe and to hope in the existence of truths. This Kant called 'regulatrices' – truths which announce to our lives credible and hoped-for hypotheses concerning present liberty and the ultimate blessing. Kant found these harbingers in both the moral imperative of the conscience and also in the immanent end of nature itself. But he took great precaution not to confuse the positiveness without metaphysics of knowledge with metaphysics without positiveness of belief.

All the misfortune of the competitive misunderstanding between science and religion has come from not observing this rigorous distinction between the two realms, so that knowledge degenerates in the pretension of science, and faith has heavily sinned by religious pseudo-scientific extrapolation. Let us take quickly two examples, the most famous of the 17th and 19th centuries. It is important to note that the first conflict dates from the 17th and not the 16th century. In contrast to philosophy it happens often that theological revolutions precede scientific revolutions rather than follow them. For example, in his sermons Jean Calvin was concerned about what could happen to the celestial ocean, which existed above the protective vault of our earth, if the Holy Spirit crossed this vault in order to descend among us. So it happens that one could be a great theologian on the presence of the Holy Spirit and a very bad mapmaker of cosmological systems. Theology thus affirmed with justice, the centrality of man, the decisive partner of the alliance with God, but wrongly deduced from it that this anthropocentric soteriology implied a cosmic geo-centrism, so much that the Bible came to take sides with Ptolemy against Galileo, Copernicus and the very prudent Descartes of the *Traité du Monde.* The sin of extrapolating from belief to knowledge, an error finally unveiled by knowledge, could only result in a disdain for belief itself. Thus the Bible was made into a pseudo-science fatal to its exhortation. For centuries we burdened it with a degenerate Alexandrian form of the Greek cosmological thought, infinitely closer to helio-centrism than to the geo-centrism of its origins.

Likewise in the 19th century the tales of creation in Genesis were used in a theologically dogmatic manner (the priestly and royal scribes had only intended to show that the separations and distinctions presented by God were in opposition to the menacing confusion of chaos), and this theological fundamentalism, exhortative for life and confessed in faith, had as a scientific consequence the refusal of evolution, the rejection of Laplace, of Dar-

win and of Mendel. Once more, the Bible was made to endorse a gross scientific error, a little like Stalin burdened Lyssenko with the transforming ideology of Soviet agriculture! But let us not mix up too much the dates and let us remember that Marx had dreamed of having Darwin accept the dedication of *The Capital*. Darwin refused, considering that the history of human societies could not be calculated with so much extrapolating assurance from the history of animal species. Later, Engels showed himself as prudent as Darwin when he wrote to the Russian sociologist Piotr Lavrov in 1875: 'The essential difference between human society and animal society is that animals, at best, collect, while men produce. This unique but important difference prohibits us from transposing the laws of animal societies, purely and simply to that of men'.

I have here intentionally reproached Marxism and Christianity (as Jacques Monod has done so often in his double denunciation of naturalist Marxist animism and creationist Christian animism, with the slight apology for the latter as having less scientific pretensions than the former), because in both cases the Kantian lesson has been forgotten: not to extrapolate from belief to knowledge, or if more modern words are preferred, from ideology to theory.

The painful recollection of these recent errors impels theology therefore to be much prudent and to announce resolutely a 'non-scientific postcript to philosophical crumbs'. 'A mimic, pathetic, dialectical in an existential composition', according to the famous and burlesque title of the work published in 1846 by Kierkegaard in favour of the subjectivity of Christian existence against the speculative and objective science of Hegel. Religion spoke of existential and pathetic values concerning the relation of man with God. It did not pretend any longer to furnish an objective and scientific knowledge of the facts, either of history or of nature. Let us note however that in the 19th century science resolutely avoided the transcendentalism and the moralism of Kant, thus assuring the triumph of knowledge over belief. Theology (and philosophy also) represented in relation to political economy about the same value which alchemy had had in relation to chemistry, as Auguste Cornu, the great biographer of Marx and Engels, told me once with an insistent smile! On the one hand, therefore, a prudent theology not straying into scientific error; on the other hand, a science disdainful towards the abnormal intrusion of the supernatural, then little by little becoming convinced that it could establish human and social life on the universal triumph of the scientific outlook. It would be necessary to trace here the evolution from the mechanism of Descartes to the mechanist materialism of La Mettrie, then to the dialectical materialism of Marx-Engels, and even more recently to the scientificity taken from the theory of knowing of Louis Althusser, for example. This evolution has tended in every case to relegate theology to the realm of subjective and dubious beliefs. Althusser calls it ironically: the only science which does not have an aim!

I would like here to recall a moment which was important for the encounter, or rather for the non-encounter between theology and science. Science after having been the competitor of religion and disdainful towards its mistaken extrapolations became, little by little, triumphant over it and indifferent to its location. It seems to me that the theological renewal, which appeared with the two great names of Karl Barth and Rudolf Bultmann, paid this triumphant science in its own coin. It is theology which has become, not exactly hostile towards science, but indifferent and often even triumphant towards it. Some have called this return to the fight neo-orthodoxy. That is wrong, because orthodoxy is of an uneasy character, anxious to conserve correctly and to defend itself continually. But this is not the climate of the theological renewal, based rather on discovery, on assurance and on a victorious offense. Actually the reaction to science is not exactly the same; in Barth the emphasis is on the objective revelation of God; in Bultmann it is on the subjective human decision of faith. But in both cases theology was, concerning the essentials of its message, unworried about the suspicions or the support coming from the different sciences. For Karl Barth it is clear that the only true science, which knows the structure and the destiny of the totality of reality, is theology or more precisely the total revelation of the God of the Universe in the event and history of Jesus Christ. His Christology is ontological, though he energetically refuses the reverse affirmation according to which ontology would be Christological as too general and too abstract. To know, Barth does not start from the world, like St. Thomas (or Bergson or Teilhard) nor from the reflective and intuitive 'me' like Descartes (or St. Augustine or Sartre) but from God himself, as he reveals himself in love and also when he hides himself in his liberty, like St. Anselm (or Pascal or perhaps Hegel with whom the liberty of God disappeared too much to the profit of the rationality and of the necessity of his becoming). That is why faith according to Barth is not a regulative belief as in Kant but a positive knowledge. Barth claims for this faith all the qualifications usually reserved for science; objectivity, universality, self-evidence, and internal proof according to its own postulates. The other sciences, that of nature, of history, of the mind, are only posterior confirmations, validating the truth of theology, furnishing it analogies, echoes and connections, testifying that revelation and universe are in a deep coherence. But only revelation gives knowledge while the universe approves and praises this knowledge which because of its own ambiguity it would not be capable of providing. The opponents of Barth have attacked the a-cosmicism of his theology of the Word. I believe it would be more exact to say that this theology of the Word is always first and that it finds in the manifestations of the cosmos the approval and the corollary to the clarity of revelation. It is therefore difficult to situate precisely the position of Barth in relation to the sciences: sometimes it is that of a quite formidable biblical indifferentism and triumphant theology; sometimes a more subtle hidden concordism where Christology furnishes the knowledge and sciences of reality, evidently purged of every last pretension idealistic or materialistic, ontological or historicist, the confirmation of the light and the Christological Word. In both cases we are not surprised to find that theologians have been so little troubled about a science with which the theology of the Word could not enter essentially into conflict, since this Word created, structured and recapitulated the real of which science analyzed the manifestations. Basically the theology of Karl Barth recovers the great patristic and scholastic emphases which preceded the conflicts of the modern period, whose disastrous confusions Kant had hoped to avoid in separating the field of objective knowledge from that of regulative, exhortatory and promising belief. His belief is religious and ethical rather than either dogmatic, in the traditional sense, or scientific in terms of the new epistemology.

Rudolf Bultmann is nearer than Barth to the modern problems and to the propositions advanced by Kant, recognizing however that Kant incorporated at the heart of his regulative reason the obligation of the moral imperative and the expectation of a possible blessing. Bultmann on the other hand has at the centre of his kerygmatic theology the reception of divine grace and the decision of the eschatological moment. But let us forget these differences of content in order to observe the resemblance of forms for Bultmann, as for Kant, there are two realms, quite different and even opposed to each other: the realm of the objective grasp of the world of things, and the other realm of existential surprise in the relations with people. Science belongs to the first realm. Bultmann sees there the essential of Greek thought: science and technique here below, metaphysic and mythology above. On the contrary, biblical faith, as with the word and inter-personal love belongs exclusively to the second realm. Science is corrupted when it brings in faith and the super-natural. Similarly faith degrades itself when it utilizes myth in order to objectify its existential relation. Science **insists** on facts and things. Faith **exists** from

events and from acts. We can see that science has perhaps here a more distinctively affirmed realm, more autonomous than perceived by Barth. But it is a realm clearly limited by its own principle of objectivity, which leaves it incapable of giving account of all that which is existential and relational. That is why I would tend to believe that the a-cosmic attitude is more apparent in the personalism of Bultmann than in the Christological objectivity of Barth. Moreover, there is no fundamental conflict between theology and science since the two do not speak with the same intent, and because, to take only one example, with Bultmann creation indicates the constant action of God with human beings but never a cosmological vision, whether that be of a mythological nature as in earlier times, or a scientific one as at present; according to Bultmann mythology and science have even an explanatory nature while the biblical message is on the contrary questioning and confessing.

It seems to me that this was the situation up to the end of World War II: an irritated science, then distrustful, finally indifferent and triumphant; a theology which was clumsy, then prudent, and finally also indifferent and triumphant – which is to say two largely separated roads, and a hidden schizophrenia for those who try to maintain a foot on each! But things and attitudes have changed considerably since. I would like to show that in two parts: One which will be a simple, practical reminder of what has happened recently in science; and the second a more theoretical attempt to articulate between scientific and theological language without putting one above the other.

II. Science and Technology question Question Themselves

I will build upon four observations. Their banality comes no doubt from the timidity of the theologian before a group of scientists more qualified than he and from whom he would not like to provoke either irony or compassion!

a. Science doubts that it inevitably brings progress. The bomb at Hiroshima preceded the possible peaceful utilization of nuclear energy. However, coal or electricity, to mention the two first stages of the industrial revolution, began by increasing the resources which appeared essentially to relieve the suffering of man. Certainly wars very often have produced inventions, but this time the invention was so massively suicidal that humanity developed a long-lasting disenchantment. Was it possible therefore that man should no longer fail to invent all that he was capable of, nor utilize all that he had already discovered? We were moving towards the freezing of research and towards the storage of realized products; the armaments race for example replaces the battle with dissuasion by means of information or by the miniaturization of already known effects. This evolution has marked scientists who have more difficulty than previously not to be preoccupied with the applications of their fundamental research and who are losing confidence in the ability of their international scientific community to be the only one which transcends passions and nationalisms. Science has become one of the most immense sources of power and like all power it is not rationally neutral, but is at the mercy of conflicts. Science is therefore not just a theory available to all, but a product reserved for some or put at the service of objectives which have their strength in domination and not solely in understanding. In brief, an independent science turns out to be dependent and often more productive of destruction than creative of welfare. This was a first great change in the dream pursued successively by Descartes, Auguste Comte and Karl Marx – seeing science as the basis and assurance of the constant development and beneficent revolution of society.

Let us add a second statement, more on the level of the user than of that of the researcher. **To the crisis of invention is joined the crisis of instruction.** It also cannot develop if it is unconcerned with its consequences; whether it be the over-production of unutilizable specialists or on the contrary, the flight from social positions which have lost their value in the process of instruction itself. Victor Hugo wrote in the nineteenth century: 'Open a school and you close a prison'. Who would still say this today? Who still tends to measure, as was the case barely twenty years ago, the development of a society by the number of students attending its universities? From the social point of view the crisis of instruction gnaws from below, while the crisis of invention, from a cognition point of view, gnaws from above. I certainly do not want to follow the fashions and suddenly destroy what has never been uniformly adored. But I note that neither research nor education are hereafter sure to realize beneficial accumulation.

b. Secondly, **the technical context seems to constitute itself as an autonomous sector,** which is neither that of nature with its internal organization, nor that of culture with its external directivity. Technique seems to constitute a third sector, which simultaneously grows and escapes nature as well as culture. It experiences also an almost autonomous acceleration. Demography, urbanization, mechanization are the sub-divisions of this technical sector in which developments seem to be neither regulated by a natural rhythm, nor subordinated by cultural knowledge. They are the necessary products of their own dynamism. Here the examples are well know: Work loses its personal interest and its global perspective to the extent that it becomes fragmented and insignificant efficiency. The city conceived for communication and intimacy becomes strangulation and solitude. In medicine the power of the struggle against the external agents of death produce also an internal suffocation. The perceptive insight of Ivan Illich is just as true in Mexico City as in New York, Geneva or Paris. The technical approach is good where man adds the tool as the extension of his own organs. The technical situation is bad when man becomes the extension of the machine, which alienates him and creates a screen between nature and culture. The tool on the contrary reconciles cultural know-how with natural rhythm. But who knows concretely the frontier between the good tool and the bad machine or how to pass it? Illich poses a true question without pretending to provide an objective and universal method of discernment. Even more, there is without doubt an inversion of the technical situation as it first helps to develop, to link together, and to embody; and then attains the threshold of decadence at which point it overburdens, oppresses, isolates and produces illusions. Gaston Bachelard makes the same point in his *New Scientific Spirit; to the extent that they depart from the realm of their original discovery, all hypotheses lose their explanatory force and their inventive richness. But there also it is difficult to determine the threshold of technical inversion and of scientific obscurantism. However that may be, the autonomy of the technical situation which is difficult to control has come to add a note of uneasiness about the accumulative benefits of invention and of instruction.*

c. Must we say that **science** (like life) **extinguishes itself within some limits?** This is an equivocal idea if it suggests that we have violated the forbidden limits (as defined by God? by the dimensions of the earth? by the nature of man?). Because nothing is forbidden even if everything does not edify, to paraphrase St. Paul. I understand limits better by translating it by 'systems'. In a very recent and interesting book (which has received in France the enthusiastic approval of a biologist like Jacques Monod, of an economist like Jacques Attali, and an anthropologist like Edgar Morin) Joël de Rosnay develops the idea that in all realms we must oppose the systematizing (not systematics) of analytical thought. Analytical thought, very perceptible Descartes, Descartes looked for the first and simple elements in order to isolate them. It practiced a linear causality of cause and effects, which did not take into account the factor of time. It took account of the forces and inves-

tigated power. On the contrary, systemic thought, much closer to Pascal than to Descartes, observed everything and where possible was concerned with the functioning of more and more complex systems for the discovery of knowledge. It practiced a circular causality with the previous and succeeding stages, always respectful of the response time. It was interested in the flux, and it looked at output rather than at power. Analytical thought was thus mechanist and reductionist, while systemic thought was organic and vital. It would not oppose culture to nature but it would hold that the best culture is finally that which copies artificially the systems of nature, without creating the abusive uses, the non-recyclable waste products, the insignificant packaging which have become the characteristics of our developed civilization.

On this methodological base de Rosnay draws a rapid fresco of the evolution of society with a new law of the three states which do not at all correspond to those formulated by August Comte in the period of triumphant science of the nineteenth century. Comte spoke of the religious period, replaced by the metaphysical period, which abolished itself in the scientific period. De Rosnay speaks of the stage of survival, where prehistoric man, dominated by nature, wrested from it his subsistence. Then comes the stage of growth, where man the artisan (then industrialized) dominates nature and exploits it without care of violating it. Today we are by the nature of things and by rational choice led to a third stage, that of conviviality with nature, where equilibrium should succeed growth, as it succeeded survival. To further clarify de Rosnay one could say that prehistoric man surviving under nature is magical, the industrial man of growth over nature is analytical and that of man living in equilibrium with nature should be systemic.

There is surely a risk of the idyllic in all these futurologies of reconciliation between nature and culture. What is important is that the most modern epistemology is here so well linked with political and social reflection on injustice, and the danger of present disequilibriums, as direct products of a wild growth, that it reveals simultaneously a more complex science and a more just politics.

d. Finally, if we proceed to a certain ideological level, it is certain that many scientists are asking about the future not in terms of progress interrupted by crises of growth, but of an alternative. The debate between Jacques Monod and Teilhard de Chardin in recent years was a high point taking up on the one hand the ancient debate between 'chance and necessity' of the Epicureans, and on the other hand the immanent logos of the world and of providence of the stoics. **Does life proceed towards the convergence and th transcendence characteristic of evolution, or is it going toward entrophy according to the laws of the degradation of energy?** O the one side there is a biological, poetic and mystic ascendance where the place of man remains central, as the terminal species providing the basis both for the extension and the duration of th whole universe. That is Teilhard and before him Bergson, and per haps also process theology for which we have no transposition outside the Anglo-Saxon world. On the other side, there is an as tonishing mythology of the progressive disappearance of culture of the wiping out of the human parenthesis, in a universe cosmi cally destined to death and annihilation, according to the second principle of thermodynamics. We know of the fascination which this 'death of man', which was simultaneously feared and pro claimed by Nietzsche, has for scientific thinkers as diverse as Mi chel Foucault, Claude Lévi-Strauss, and Jacques Monod, in spite of his existentialist ethic, and Louis Althusser, in spite of his Mar xist scientificity.

We are indeed very far from the triumph of science over the obscurantism of the past centuries. But we still have not resolved very satisfactorily the question of the articulation of the theolog ical word in scientific language, because if it was false to think tha religion lost that which science gained, it would be still more false to imagine, or worse to hope, that faith would strengthen itsel when science was weakened.

III. The Articulation of Languages

Indifference is passing away, at least at the practical level, to the extent to which science and technology have turned towards religion and theology. Conferences with a limited objective, like those organized by the Department on Church and Society on the chances and the risks of genetic control or the utilization of nuclear energy, prove by their success that researchers and theologians can help each other, as questions of ethical and political choice appear needing an evaluation of the future which proceeds less from an objective spirit than from moral deliberation based on advantages and disadvantages, preferential choices, priorities, refusals, risks, decisions. Scientists and theologians can find each other at a similar active level of deliberation, once the available scientific information is furnished and once the human alternatives with which we are faced are exposed. Politics, in the larger sense of the orientation of our collective decisions, serves here as a mediator between science and theology. For science is not just the research for knowledge. It is also the producer of power. Epistemological in nature it is also political in its practice. Even theology while contemplative or speculative in its nature, since it seeks to reveal its understanding and vision of God, is also political, since it aids human beings and societies to take sides when justice and liberty, solidarity and truth are at stake. There is therefore undeniably a place for political and moral encounter of science and theology.

But this place remains too uniquely pragmatic. The relation between that which theology testifies to and that of which science takes account are not thereby clarified. I believe that we must recognize that until now our ecumenical conferences have rather failed to offer a theoretical articulation between science and religion. If I take my first image, the first and the third man of the ecumenical dialogue, they have met by means of the second but they have not succeeded in making a direct relation between the two. I see two reasons. First the timidity and indifference of theology. Timidity due to the fear still of reproducing the errors made before Galileo and Darwin. (Jacques Monod is ironical about this animism of the Christians, who are inconsolable because the physical universe does not include a theology and still less an immanent theology). Indifference when theology is satisfied with the Word and is unconcerned with the natural sciences, with history and with man, and when it cares little about the language of others

because it has its own means of discourse. None of these attitudes, neither that of the startled nor the arrogant, favour reflection on the articulation of languages.

On the side of the scientists I see also two attitudes. That of those who hold on to the rule of objectivity, the foundation of the scientific spirit (causes and effects, flux and systems) even if they cannot deduce any morality or political line. These latter spring out of a purely personal engagement without any support either from the movement of the universe or from the assumption of God. Jacques Monod is a good example of this impure mixture of non-scientific objectivity and of non-theological existentialism. Such scholars come rarely to encounters of the churches being still convinced that theology is only an ideology of orphans seeking for an absent supernatural consolation. And those who come would be willing to accept a certain place for religion on the condition that, as Joël de Rosnay says, it is emergent and not revealed, tolerant and not authoritarian, and if I understand rightly, cosmic and not biblical. Religion like reason would have the role of unifying experience. Let us add here as a minor note that religion, especially Franciscan more than Pauline, Thomist, Calvinist or Barthian, would have, like music, the role of softening mores and inviting man to that fraternity with nature and the cosmos, so necessary for the next stage of human development. But I fear that this type of religion, judged useful by certain scientific spirits, only confuses the uniqueness of God with the unity of the universe. Their God is not the **only** God who rightly, because of the unique character of his person, requires for knowledge of him a persuasive revelation, which is neither authoritarian nor constraining. Their God is like the old **Plotin, the one,** the manifestations of which are everywhere extended, in whom are seen the satisfying and perhaps also the suffering presence. But the Bible speaks of the unique God and not of the divine One, which risks always devaluing the multiple, while on the contrary the unique God values the disconcerting variety and complexity of creation. I do not know therefore if when the religious scientists speak of an emerging and unifying principle, and when the biblical theologians speak of a living unique person they are speaking of God as the same reality. I could propose other differentiations, fairly distant from those of Kant, after having first affirmed, rather than a convergence, a similar status for science and for theology.

Science like theology to for understanding. It is necessary to avoid here the two antithetical words: science against belief! Knowledge implies the alterability of an object which simultaneously resists and permits itself to be known, as with the universality of a comprehension which is neither unreasonable nor esoteric even if it is realized by different methods. In the place therefore of opposing, in the manner of Kant, the objective without absolutes to the transcendental without objectivity, it would be necessary to use this term understanding which permits a reciprocal esteem between science and theology, between observation in the pursuit of hypotheses and revelation followed by obedience. Science and theology have in common the wish to be able to know, without which science limits understanding to objective observation, while theologies would only utilize revelation to dispense with the slow task of better understanding. In these two cases all articulation between the languages would be impossible - science condemning theology to subjective phantasy and theology refusing to submit itself to the process of objectivity which exists but which never can interpret a dogmatic definition nor can it appropriate a religious experience.

If it is accepted that there is in the two cases a possible and universal understanding, it is necessary then to see the differentiations between the two languages.

The Belgian theologian, Jean Ladrière, has worked out a distinction of the orders which, in my view, is inspired by the three orders of Pascal (the body, the mind and the heart), but with the advantage of being applicable to the present diverse ways of knowing and which particularly shows that the frontier between the realm of science and the realm of belief is very much less sharp than Kant had said. Ladrière schematically distinguishes mathematics with their absolute transparence from their formal operations; the natural sciences with the hypothetical constructivism of their representative verifications; the human sciences with their double slope: their structural slope which formalizes the regularities, and their hermeneutical slope which introduces the equivocalness of interpretations (philosophy, perhaps the most contested today, and which in our time appears without origins and without ends, continues to pose the fundamental questions of the global systems). And finally the word of faith which establishes a relation of man's listening, proclamation and praise with the truth. We can certainly discuss this architecture of understanding. What is important in my view is that it not be presented as a hierarchy, with some ways of knowing above and others below, but as a gearing down of this word understanding – understanding not acquired according to the same procedures in every realm, and never embellished with all the guarantees, but which offers itself as a rainbow possible to each human spirit. Understanding is not an accumulation of knowledge, of the superior or the inferior (varying according to the ideology of each!) but as a field of possibles, where it is permitted to enter rationally and work according to the free will and also according to the free gifts of each. We can see also that between mathematics and faith there is a wide and diverse field, where the use of the word science is often pioneering, as when it stands sometimes for constructivism without challenging the real (which as Bachelard, Heisenberg and Oppenheimer have so well said dematerializes itself today). Sometimes it stands for discernment without uniqueness of meaning, sometimes for summation still desummarized, to speak like Sartre in the *Critique of Dialectical Reason.* There is thus a will and a possibility of understanding and there are the diverse ways of knowing. But there is more the unity of science. It is without doubt easier to articulate between these diverse types of knowledge than to unify them on a single base which for some would be onto-theological and for others empirico-mechanist; or to make an opposition in the manner of Kant between statutory understanding and a regulative belief.

Another differentiation: Science seeks constants, what we called the laws and which today are rather called structures and systems, even if these remain uncertainly and disconcertingly open since scientific progress is achieved by provocative irregularity and life itself develops by unforeseen mutations. On the contrary, biblical theology bases itself on significant contingencies (the Exodus, incarnation, the cross, the resurrection and eschatology) which correspond to the creating dynamism of God, even if these contingencies give rise later to constants – or to employ a more personal word – the fidelities of faith, of hope and of love. I see there a much more fundamental differentiation than that between science and faith. For example, evolution remains a constant while creation is a contingency. The constants inform, the contingencies speak; at least one can distinguish in them between grace and chance.

Finally, the implication of science and of theology also remains quite different. The two are constituted by an obedience to a constraining impairment. But the constraint of scientific observation is not exhortative nor annunciatory in the way in which the constraint of revelation is in the biblical witness. Perhaps it is a question, in the first instance, of a constraint which informs and in the second of a constraint which calls.

These appear to me as some clarifying differentiations. But more important than these is the common and diverse knowledge which we should be able to affirm between science and theology, if we wish these encounters between scientists and theologians to go beyond the competitive hostility and beyond also schizophrenic indifference, and towards a reciprocal and beneficial articulation.

AN EPISTLE TO JUDITH: THE CHURCH'S RESPONSIBILITY TO THE SCIENTIFIC COMMUNITY

* *G.R. Williams*

It will be the contention of this paper that it is high time that someone wrote an Epistle to Judith. C.S. Lewis could surely have done so. Such talents are not available to the present author, though I shall try and explain who Judith is and why some successor to St. Paul should write her a letter.

Who is Judith? I do not have in mind the ferocious widow whose story is related in the Apocrypha. I am thinking rather of the heroine of Bartok's opera 'Bluebird's Castle' and my metaphor is borrowed openly from Georges Steiner's T.S. Eliot Memorial Lectures. Judith thus becomes the symbol of the questing Western intellectual tradition, fatally obsessed with the pursuit of truth. Of this tradition, science is in some sense the culmination and technology the product. Why does she need an Epistle? I use this as metaphor for my deep concern that the Church should find some way of addressing the scientific community at a moment of crisis. Let me quote Steiner.

'We cannot turn back. We cannot choose the dreams of unknowing. We shall I expect open the last door in the castle even if it leads, perhaps because *it leads, on to realities which are beyond the reach of human comprehension and control. We shall do so with – desolate clairvoyance – because opening doors is the tragic merit of our identity'.*

Can it really be doubted that Judith the opener of doors needs a word from the Church which claims to have its own insights into human responsibility and destiny?

I would suggest that an Epistle to Judith would contain two messages, one counselling caution and reminding her of her responsabilities, another undergirding her will and recalling her to her destiny. Perhaps the greatest difficulty that our latter-day Paul will have is to reconcile these two messages,

Let me drop for a moment my metaphor and state my point less obliquely. Science is presently under the most intensive critical barrage it has had to face since the late nineteenth century. The attack comes both from within and without. Two recent works may be singled out as representative of both forms of assault. The former is typified by J.R. Ravetz's 'Scientific Knowledge and its Social Problems', and the latter by T. Roszak's 'Where the Wasteland Ends'. A single quotation from each will serve to point out the directions of the critical thrusts which will in any case be well-known to particiapnts in the Consultation. First, Ravetz.

'For the industrialization of sciences has produced another set of moral problems, internal to science but still incapable of solution through a working ethic that was conceived in terms of the search for truth, and organized around the protection of well-defined intellectual property. As the ideal of truth has become obsolete, and the location of intellectual property has shifted, this ethic has lost its relevance. The very naturalness of such conditions as shoddy science and entrepreneurial science ensures that they are connected to good work by a multiplicity of continuous gradations. A scientific entrepreneur may produce a piece of genuinely good work, but then use it for further inflating the stock of his establishment; has he violated the ethics of science? A piece of work may be condemned as shoddy, but may then be defended as the best work a particular man could do in a difficult field; the assessment of quality of scientific results is subtle enough and who can be sure of the intentions of another? And if a man does not wish to belong to a community of colleagues of the traditional sort and does not need it for the building of his personal career in science how can the informal penalties of disapproval be applied against him. Thus there is no escape from moral problems in science, even in the purest of pure science, except perhaps in those enclaves which have not yet been affected by industrialization and its social consequences'.

Ravetz states elsewhere,

'At the present time, the deepest problems in the understanding of science are social rather than epistemological.'

For Roszak on the other hand it is the false epistemology of science which constitutes the problem.

'Ultimately, it will only be those who experience the agony of a psychic claustrophobia within the scientific worldview who will be able to take radical issue with the technocracy – and they will do so on matters that vastly transcend the issues of conventional social justice with which the radicalism of former times filled its now obsolete ideologies. They will see that the expertise we bow before derives from a diminished mode of consciousness. They will recognize that the ideal of scientific objectivity is our common disease of alienation grandly disguised as respectable epistemology. They will come to understand, in their pursuit of a reality justly proportioned to the full dimensions of our human nature. That it is the culture of science from which we must liberate ourselves if we are to be free spirits'.

It would seem that Judith is being criticized on two grounds. On the one hand it is being suggested that she has abandonned her authentic self, has lost her drive to open doors and is settling down to the luxurious life of a hetaera in Bluebird's castle, with attendant duties but little risk. On the other hand it is being suggested that the doors she opens, open merely on illusion. Thus our St.Paul is faced with a number of pastoral tasks. On the one hand he must admonish Judith. If Ravetz is correct when he speaks of 'shoddy science, entrepreneurial science, reckless science and dirty science' then the Church has a mandate to recall scientists to a nobler conception of their calling. It has been asserted frequently, most notably in a well-known quotation of A.N. Whitehead's that science was born out of the Judaeo-Christian 'confidence in the intelligible rationality of a personal being'. If the Church was in any sense midwife to, or even the womb of the scientific search for truth, then Christians cannot fail to protest when science degenerates to 'pointless publication' or when the 'goals of a career in science can change from being a series of successful research projects made possible by a parallel distorted series of adequate contracts, to being a series of successful research contracts made possible by a parallel series of adequate projects'. The recent Palisomar conference may have removed some of the reasons for accusing molecular geneticists of recklessness but both in this and related biomedical areas, and in other areas such as nuclear engineering problems of great ethical intricacy will con-

* Prof. G. Ronald Williams is Professor and Chairman of the Department of Biochemistry at the University of Toronto, Canada.

inue to arise about which the Church must be prepared to inform tself and to contribute to the ongoing debate.

The criticism of science as distorted by powerful social and neurotic forces is one which has been responded to by Michael Polanyi in a language which resonates in a highly stimulating manner with Christian thought. Our imaginary writer of the letter to Judith will surely have to rely heavily on Polanyi's analysis of the nature of the scientific enterprise. Polanyi's approach would admit (though not of course condone) all of Ravetz's expose of the distorting factors affecting modern science. Both Ravetz and Polanyi use the image of the Fall, Ravetz speaking of a loss of scientific innocence which he precisely localizes and dates at Hiroshima. Polanyi equating 'Fallen Men – to the historically given and subjective condition of our mind'. From this fallen condition, Polanyi suggests that the Pauline solution of redemption by faith also presents an analogy. The act of faith is a commitment of a personal nature which is saved from subjectivism by its universal intent.

'In so far as they are acting responsibly, their personal participation in drawing their own conclusions is completely compensated for by the fact that they are submitting to the universal status of the hidden reality which they are trying ro approach'.

This affirmation by an investigator of a reality existing independently of him is made in the exposure of his claims to his fellow-scientists for criticism, repetition and extension.

Roszak speaks of Polanyi with approval but I believe only in the sense that the accepts Polanyi's description of the behaviour of scientists. The 'hidden reality' of which Polanyi speaks is for Roszak 'but one segment of a far broader spectrum' and it is this belief on the part of Roszak which underlies his critique of scientific epistemology. 'The well-focused eye may see sharply what it sees, but it studies a lesser reality than the enraptured eye.' I would suggest that it is a second pastoral task of our epistle-writer to affirm to Judith the reality behind the doors she opens. When Roszak speaks of the 'empirical lie' and calls for a return to 'the Old Gnosis' it may be necessary for Christians to stand with the scientific enterprise. Roszak indicts the Judaeo-Christian desacralization of nature as the historical path to the single vision of contemporary reductionist science and I would suggest that if the Church was prepared to take the credit for being the midwife of science when that offspring seemed healthy and thriving it should not lightly desert the child when he appears in court as a juvenile delinquent! An answer to Roszak's indictment might find a useful starting point with Polanyi's insight that 'The stage on which we thus resume our full intellectual powers is borrowed from the Christian scheme of Fall and Redemption' but my own inclination is to suggest that our letter to Judith should base its affirmations more firmly in the Church's own credal commitments. The problem with Polanyi's analogy is to discover an analogue to Grace. Partly because of my own professional commitments as a biochemist I cannot accompany Polanyi when he finds this analogue in creative forces at work in the process of evolution which have brought into being man with all the intellectual powers needed to guarantee that his scientific commitment will be fruitful. I do not believe that the Christian will understand the claim of scientists to speak of reality in terms of a metabiological theory, although if there are any followers of Teilhard de Chardin at the consultation they will probably want to differ with me on this point. In fact I would find my starting point rather in some words of de Chardin's most trenchant critic, Peter Medawar. Medawar writes of the scientist's devising of a hypothesis as 'the invention of a possible world' which can be compared with the real one. The problem then is to understand a human creativity which can be compared with the creative act of God. The point is elegantly put by W.A. Whitehouse.

'And yet, no world could be more real than this one which we are crystallizing out of the matrix of experience and which has survived the tests for reality which are built in to the formal structure of mature human science. This, I hope, will suggest to you how much more momentous science is (and with it our less precise modes of rational experience) than if it where to be regarded merely as the description of preformed being. Here is a powerful reinforcement for the idea, widely entertained in cruder ways and on less serious grounds, that man's creative intelligence should in some respects take the place which has been traditionally accorded to God as the creative intelligence of the world.'

If Whitehouse is correct in this assertion then the Christian understanding of the possibility of man as a creator of the world must surely be grounded in the prologue to the Gospel of St.John. Science properly understood, Judith's very ability to open doors, must for the Christian be connected with his belief that the historical and social particularism or the Incarnation did not prevent the life of the man Jesus from being a complete revelation of the all-creating Word. It is helpful to recall at this stage in the argument that the Biblical creation story in part includes the Babylonian myth of the overcoming of chaos (Psalm 104:5-9). One of the most obvious features of the world behind Judith's doors is its orderliness I do not think I do Roszak an injustice if I say that his universe is fundamentally disorderly, inhabited by dragons, moved by chtonic forces. Against such a universe, on which no doors of certainty can open, man the bringer of order has pitted himself in a long struggle. It is clear that the material and economic power accrued as a direct result of the struggle has now diverted scientists from their historic task. And the attempt to impose order autonomously has led the scientist into a series of crises of which the technological despoilation of the planetary ecosystems is our most striking symbol. As Judith pauses before the next door she might ponder another quotation from Whitehouse.

'It is possible that the world, in this historical order, is moving toward a crisis – not necessarily to be identified with any climax of the era of atomic armaments – where mankind will have to demonstrate in some finally decisive way its ability to hold chaos at bay. In such a crisis at any rate, the questions raised by religious testimony will at least become interesting; for the crisis may serve to demonstrate the importance of autonomous mankind as a source of order in such a world as this, and chaos will come again'.

Within the metaphor I have been employing throughout this paper there is an obvious way of referring to this crisis. The question must be faced by the author of our Epistle to Judith – must he advise her that there are doors that should not be opened? For there is a real sense among many that the next door may be the last one. My metaphor was borrowed at the beginning from Georges Steiner, let me now return to a more recent essay by the same author which has probably not yet become widely known.

Each year the Canadian Broadcasting Corporation presents a series of radio talks entitled the Massey Lectures. In the Fall of 1974 these lectures were given by Steiner. His fifth and final lecture was entitled 'Does the truth have a future?'. In the context of the World Council of Churches consultation a particular interest of the lecture lies in the fact that Steiner uses as his symbol of the pursuit of truth which has characterized the Western intellectual tradition the New Testament text 'the truth shall make you free' (John 8:32). Steiner writes:

'The promise which we find in the Gospel, that truth shall make us free, became a cardinal article of secular rationalism and of political liberalism. You find it in a very moving way inscribed to this day on public libraries all over the United States. It is a crucial Jeffersonian moment of trust. Pursue the truth, get it right, and you will be a more complete, a freer human individual'.

He goes on to discuss various reasons why this faith is now called into question by an anti-rationalism which brings into al-

liance a mysticism for which Blake is the prophet and a radical social analysis which insists that the concept of abstract truth is merely an expression of bourgeois ideals and a mechanism of oppression. Steiner is less interested in these critiques than in the idea that man in his pursuit of truth may in fact be risking his very existence.

But there is also, and I think far more worryingly, for the first time in the Western tradition, an incongruence, a coming out of phase, between truth and human survival, between the rational pursuit of truth and contrasting ideals of social justice. It is not only that the truth may not make us free, but that it may destroy us'.

The fear which Steiner is expressing is not answered by anything we may have said to Judith so far. The world behind the doors may be one in which the scientist can call order into being but that order might be the order of 'a universe which was in no way built for our comfort, let alone for our economic and social progress on this tiny Earth'.

I should very much hope that the consultation in Mexico can spend some time responding to this very profound challenge. There is little evidence that Judith will heed our epistle as she stands before the last door. I do not believe that this is a reason for the Church to desist from the attempt to find ways to address the scientific community. Christians will be unwilling to abandon their belief that 'the truth shall make you free' as 'our greatest romantic illusion'. But before Judith can be encouraged to open that last door we must be sure that the truth which is sought is the truth not only of the order of the world nor even of the reliability of the world but rather that of the glory of creation. Let me quote from the closing words of Whitehouse's lectures.

'Mankind can no longer shape its course by observation of a sacred order in Nature; nor can we find in the cosmos any guiding goodness, eloquent of something beyond the world to which mankind's activities will, if we are wise, be conformed. Man is a king, who has risen from below, and who now has to learn in new ways the asceticism which is demanded from a king. In this predicament he has the opportunity of achieving unprecedented distinction. He can bring to bear upon the situation a considerable weight of distinction already achieved. Can he see the world as an expression of grace and so find in it hints of glory to which he may respond with gratitude?'

Can we go further? If there is a hint of the Incarnation in the ability of scientists to create order in the universe on in the ability of scientists to impose reliability on the world, what Biblical hints are there for the search for grace in the world? Probably only in the identity of Jesus as the Suffering Servant. If the Church is to understand science in the Light of the Incarnation then it must infer the role of science as servant. Judith's opening of doors is to be commended not as an act of *hubris* but as an act which offers liberation. Such I hope to be the promise of 'critical science' and it is in that development also that I believe there is a hope that the Church's responsibility to address the scientific community might be fulfilled.

THEOLOGICAL DIMENSION OF TECHNOLOGICAL CULTURE: WHY YAHWEH NOT BAAL?

** Kosuke Koyama*

Human life must have experience of the holy in order to remain human. It is not a matter of 'ought to have' but rather 'must have' in the sense that this unique experience defines man's basic humanity. Man who lives in his 'primary words of I-Thou and I-It' (Martin Buber) lives in the constant possibility of encountering the holy. That man can feel a 'problem' with the holy and that man can distinguish the works of the clean spirit from those of the unclean spirit is his inbuilt capacity to glory and tragedy. Some may have a more intense experience of the holy than others (Isaiah, Jeremiah, Paul, St. Francis, Gandhi, Hammarskjöld and so on). What concerns me here is not so much the aspect of individual experience of the holy, but rather any given culture's experience and expression of the holy. If a culture is to remain human culture it must have, at its depth, encounter with the holy. If a civilization is to remain human civilization it must have, at its depth, encounter with the holy. Culture has personality and spirituality. The experience with the holy is at the source of the personality and spirituality of culture. No culture is unrelated to the holy. Culture stands inescapably in a love-hate relationship with the presence of the holy. Outstanding individuals whose lives have been shaken by the sense of the presence of the holy illuminate and enrich the personality and spirituality of the culture in which they appear.

* Dr. Kosuke Koyama, formerly Director of the South East Asia Graduate School of Theology in Singapore, is now Senior Lecturer of Phenomenology of Religion at the University of Otago, Dunedin, New Zealand.

Holiness is the fundamental character of the Biblical God. 'Holy, holy, holy is the Lord of hosts; the whole earth is full of his glory. And the foundation of the thresholds shook at the voice of him who called and the house was filled with smoke' (Isaiah 6:3.4). The reality of the divine holiness permeates the whole earth, all beings, all civilizations and all cultures. This is precisely the moment of judgement upon our history. 'For judgement I came into this world', the holy Son of God declares, 'that those who do not see may see, and that those who see may become blind' (John 9:39). In the Bible the holiness of God expresses itself through the variety of rich images; fire (it is in fire that the holy God reveals himself), *jealousy* ('God is a devouring fire, a jealous God', Deut. 4:24), *wrath* (holy wrath of God), *fear* (dread, terror, awe, reverence, Yahwed is a great and terrible God, Deut. 7:21), *remoteness (taboo,* man is forbidden to appropriate what belongs to God; when Yahweh is about to descend on Sinai, the whole mountain is placed out of bounds), *cleanness* (against that which is profane and unclean), *majesty (splendour, honour, beauty, glory, spaciousness), unsearchable, incomprehensible, incomparable* (the limits and mysteries of his ways are beyond all human wit and ken), *wonderful* (the ways of God are not man's ways, Isaiah 55:8), *great* (O Yahweh my God, thou art very great!' Ps.104:1), *exalted* (the Holy One of Israel is 'high and lifted up', Isaiah 6:1), *living* (the life of Yahweh and his holiness are closely related: the divine oath 'As I live' and the human counterpart; 'As Yahweh lives' – I Kings 17:12 – are holy language).** Experience of the Biblical God is an experience of the *Holy* God. And 'the whole earth is full of his glory'.

Recently I was given an opportunity to watch an open-heart operation at Dunedin Medical School in New Zealand. From the balcony I saw a team of doctors and technicians at work with supreme concentration. The operation theatre, every square inch of it, was charged with the sense of man's dedication to saving human life. Sophisticated medical machines, all interrelated by the network of wires and tubes, were in personal communion, as it were, with the people working in the theatre. The life of the patient had been dependent on the working of the machines for four hours when I was admitted to the balcony. As I watched the pale white face of the patient undergoing this major operation, I sensed the presence of the holy. It is *good* to save human life. But the atmosphere of the theatre was not simply that of 'good' but 'something more', – *numinous,* 'the holy', to use Rudolf Otto's expression.

We are today living under the unchallenged supremacy of Western civilization. It is the civilization which has made the strongest, most universal and penetrating impact in the history of mankind. After a long historical preparation of aspiration and frustration, the spirit of the West exploded from the 16th century onward and began to give astounding modernization thrust to the rest of the mankind. No one upon this planet of ours is free from the impact of this 'Whither shall I go from thy Spirit of Western civilization. Or whither shall I flee from thy presence? If I ascend to heaven, thou art there! If I make my bed in Sheol, thou art there!...'. Its phenomenal contribution to mankind is focused in the area of science-technology. Science-technology is not the whole story of Western civilization, but it is undoubtedly the most substantial expression of the life and performance of this civilization.

Western civilization has drunk heavily from Judaeo-Christian theology (the Intelligent and Purposeful Creator), cosmology (cosmos deprived of its ability to terrorize man), and anthropology (image of God, responsible administrator of the creation). One cannot say this of the Chinese or Indian civilizations. Western civilization stands in a special relationship to the Judaeo-Christian spiritual and philosophical heritage. In its submerged memory lies Hosea 2:8' ... and she did not know that it was I who gave her the grain, the wine, and the oil, and who lavished upon her silver and gold which they used for Baal'. All appearances to the contrary, in its depth, Western civilization cannot free itself from the theological insight that the wine and the oil (nature and all products of nature through technology) which come from the Holy God must not be used for the glory of Baal. This high-strung theological awareness I do not find in Asian civilizations. The prophetic criticism '...they used for Baal' lays bare the root of the spiritual orientation of Western civilization. It shapes the fundamental character of the spirituality of the Western civilization. Western civilization is brilliantly capable of creating super-abundance and 'salvation' out of mere 'wine and oil'. Since its own capability is immense, its temptation to forget the Giver is equally immense. It must use 'wine and oil' for the truthful benefit of mankind acknowledging the Giver. '... for you shall worship no other god, for the Lord, whose name is jealous, is a jealous God' (Exodus 34:14). Western civilization must walk on the tight rope called the mind of a jealous God stretched above the danger of Baalism with its own heady creativity! No wonder that this civilization has produced a guilt-conscious culture and neurosis, more than other civilization.

At this point of reflection, I wish to review briefly what I see to be the three outstanding characters of our technological culture.

(1) Technological culture programmes and schedules man. Telephone directories, airline schedules and computers are a symbol of this aspect of technological culture. Time is technologically handled. It is tamed since it is forced into the framework of programmes and schedules dictated by the technological efficiency mind. Time is now being looked upon technologically and not spiritually. When time is not spiritually appreciated the sense of 'history' suffers. The holy which is in history refuses to let history be programmed and scheduled. Western civilization is aware of an irritating alienation between the psychology of technological time and the time of the God of Abraham, Isaac and Jacob.

(2) Technological culture is energetic. This culture lives by consuming a fantastic amount of energy (fossil fuel). Each person in this culture is, as it , an 'energized person'. There is a difference between an energized person and an inspired person. The former is technological while the latter is religious. An energized person naturally uses his energy to keep himself away from suffering. He learns how to live at a technologically arranged distance from human suffering. This distance signifies both humanization and dehumanization. As long as technology places man at a reasonable distance from suffering (famine situation controlled by technological transportation) it means humanization. If the distance to suffering becomes too great (voracious consumption of the non-renewable natural resources in the face of the emancipated portion of humanity) it means dehumanization. Suffering is now being looked upon technologically and not spiritually. When suffering is not spiritually appropriated the holy integrity of the human soul suffers. Western civilization is aware of the tension between 'energized man' and 'inspired man' who looks upon human suffering spiritually.

(3) Technological culture strengthens 'I-It atmosphere' in our spiritual and mental environment, to follow the thought of Martin Buber. Technology aims at **use** of nature for man's benefit. The concepts *use, programme* and *schedule* are all intimately interrelated. 'And in all the seriousness of truth, hear this: without **It** man cannot live. But he who lives with **It** alone is not a man' (Buber, *I and Thou,* p.34). Western civilization is aware of this tension.

Western civilization is not taking mankind to the theology-free zone. When man is touched by the effect of the Western technology, he is touched by theological issues: (1) Is man to be sche-

** The above summary is based on the article 'Holiness' in *The Interpreter's Dictionary of the Bible* by Professor J. Muilenburg.

duled? Is the experience of holiness programmed? How is the holy experienced within the technological society? (2) How may human suffering be approached spiritually in the day of technological culture? What is the spiritual within the context of the technological? (3) How is holiness experienced within 'I-It relationship?'

Technological culture is a high-octane culture. Since it is powerful the temptation to self-glorification and self-deification surround it. The question of idolatry has been for some time an urgent theological and cultural question within technological culture. I wish to examine this question by suggesting three different nuances found in the Biblical criticism against idolatrous situations. I am hoping that even though brief, such an attempt will throw some helpful light upon the theological dimension of Western civilization.

(1) Exodus 32:4

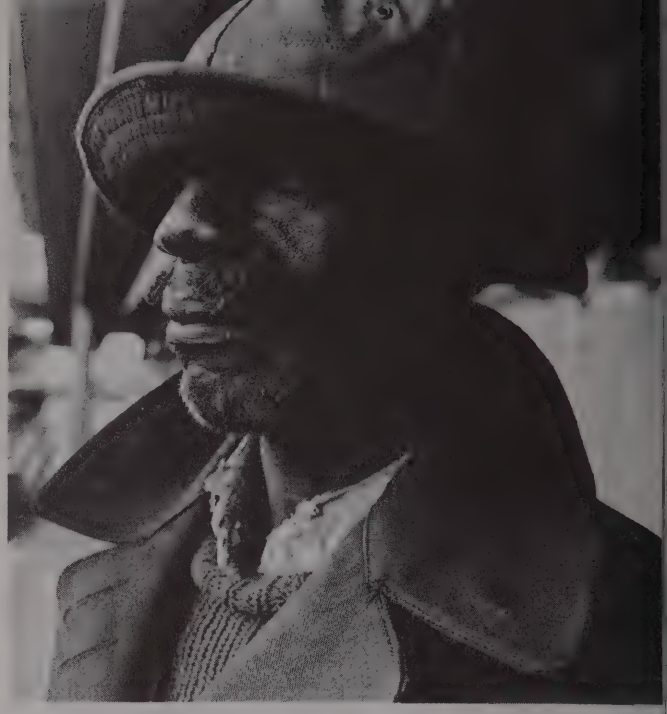
Exodus describes a blatant example of idolatry. 'And he received the gold at their hand and fashioned it with a graving tool and made a molten calf; and they said 'These are your gods, O Israel, who brought you up out of the land of Egypt!' Idolatry is an extraordinarily active spiritual situation. First of all, there must be a historical experience of salvation (Exodus). Then idolatry willfully denies glory to whom it is due and gives it to someone else. In this sense idolatry is a possibility only in the religious tradition in which the holy God of *Heilsgeschichte* stands at the centre. The Indian religious tradition, which lacks the concept of history-concerned jealous God, cannot produce lively discussions on idolatry.

Western civilization is too secularized (neo-paganism?) to say 'These are your gods...' to technological devices. It is in this sense not idolatrous. We live more or less theologically colourlessly. One must not hasten to accuse technological culture of committing self-deification. What we hear today is generally no more than 'these are useful, ... these are beneficial, ... these are efficient, ...' but not 'these are your gods'. Technological culture is secularized but not idolatrous. Secularization is not directly idol-making. The spirit of secularity is perhaps keeping us from falling into idolatry!

(2) Genesis 11:1-9

There is a poignant story about man's achievement in the book of Genesis. People migrated into the plain of Shinar. They were an energetic and hopeful people. They issued a call to nationwide mobilization. 'Let us use our fire technology and make bricks. With these thoroughly baked bricks let us build ourselves a city with bakeries, restaurants, grocery-stores, schools, hospitals, post offices, insurance buildings, bridges, factories, horse-race tracks, laundromats, ...**and** 'a tower with its top in the heavens'. Let's have a building which has something to do with the heavens, since that is the way to make a name for ourselves.' We do not need an ordinary name. We need an extraordinary 'heaving-touching name'. name'. If we have such name we would not be 'scattered abroad upon the face of the whole earth'. The holy jealous God frustated men's pursuit toward the 'heaven-touching name' for themselves. The story ended with the chilling note of **babel.**

Technological culture today does not aspire to create a 'heaven-touching name'. True, it has made unprecedented giant strides which have influenced every area of human life. True, it has created a **babel** situation by ambiguous uses of science-technological potentials. But to be fair to technological culture, in contrast to the worlds of economy (premeditated insatiable monster of the multinational corporation) and of politics (premeditated endeavour to grasp absolute power), it is not intending to make a 'heaven-touching name'. It has not **premeditated** to touch the heavens. One cannot make a straight application of the story of the tower of Babel to our technological culture, suggesting that it is committing the hidious sin of self-idolatry. Science-technology walks into the 'areas of ultimate concern', particularly in the life-sciences, but it



does not premeditate to achieve the 'heaven-touching name'. In this sense, it is not idolatrous. Creative babel (!) is better than stagnant orderliness, particularly when it is free from this arrogant premeditation. Our technological culture is rather more creative than stagnant. The theological value of this creativity is that it is creative without premeditating the possibility of making itself absolute.

(3) Hosea 2:8

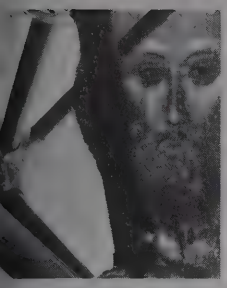
Hosea 2:8, as we have seen, speaks a sharp prophetic criticism against the Baal culture, the culture of self-contained, self-energizing, self-enthusiastic, self-resourceful, fertility-vitality. Fertility must be subjected to the mind of the Giver of fertility. The reality of fertility must be gratefully appreciated in the light of the giver of the fertility. Baal is **not** 'sex' (fertility, created potentiality, love-related value Creator-related value) but 'sexism' (demonic isolation of fertility-potentiality from the integrity-concerned mind of the Creator). Jahweh gives and blesses sex while Baal promotes sexism. This contrast between Yahweh and Baal is clear and forceful. The contrast is, however, not that easy to discern. It took Hosea's personal and prophetic struggle to discern the 'subtle' difference between Yahweh and Baal. Is it easy to discern the difference between sex and sexism?

Discernment between Yahweh and Baal has become progressively difficult as we distanced ourselves from the modest technological and urban situation of the Biblical times and begin to live in the present day context of super science-technology. Technology has given us super-fertility and super-productivity. The reality of technological super-fertility intoxicates us. We are not concerned to find out how Yaweh stands to this super-fertility. Do we know today 'that it was I who gave her super-fertility and super-production by means of sciences and technology'? Do we have this knowledge? This confession of faith? Distinction between Yahweh and Baal comes with this insight taken from the complaint of Yahweh against Israel. This insight begins to set us free from the grip of sexism to the blessing of sex, from fertility-ism to fertility, and from Baal to Yahweh.

Baalism-sexism paralyzes human integrity. Neither in the direction of blatant idolatry (Exodus story) nor in the direction of the 'heaven-touching name' (Genesis story), but in the direction of human integrity, in the battleground between 'sex' ('...she did know that it was I...') and 'sexism' ('...she did not know that it was

[...'), I see the major challenge as well as danger for our technological culture.

Acknowledgement of the Giver! Is that so important? So decisive? It is decisively important for us today to see fertility (technological super-fertility, and production) in the light of the Creator-Giver. When fertility is enjoyed apart from the Giver, fertility will go into tragic 'Babylonian Captivity' by the demonic **pre-meditated** power of the economic and political self-absolutization. Today technological culture experiences the presence of the holy as it struggles to free itself from the 'Babylonian Captivity' through its awareness of the presence of the Creator-Giver. Western civilization, consciously or unconsciously, cannot sever itself from Hosea 2:8! Our everyday technological life (Is man to be scheduled? How do we approach human suffering spiritually? How do we experience holiness within 'I-It relationship?') is gradually pushing us to see the difference between '...she did not know it was I...' **and** '...she did know it I...' I...' Western civilization is then presenting us with an intensely theological life situation.



WHAT DOES GOD DO IN THE WORLD?

** Charles Birch*

God and Efficient Causation

Much of the history of science, certainly from Newton onwards, seems to be a record of happenings in which action by God is excluded from the explanation as quite unnecessary. Newton could find nothing for God to do once the universe was set in motion, except on occasions to intervene to keep the timing right. In so far as God did anything in the Newtonian universe it was to push matter around, and that somewhat occasionnally. Newton's inverse square rule about the gravitational attraction between bodies accounted very nicely for the motions of the planets. Newton did not know, nor do we, what gravitation is. He knew its effects. He certainly did not call it God for that would have added nothing to his explanation. The Newtonain universe with its doctrine of simple location of particles, big and small, that were pushed around by each other, pushed God outside the system as a sort of *Deus ex machina.* God had little, if anything, to do in the universe.

Charles Darwin had much the same influence in the realm of the biological world. Actions attributable to God by his contemporaries, Darwin described in the strictly mechanical terms of natural selection of random variations. There was nothing mystical about either notion. Indeed they are, in essence, quite simple concepts. He saw that it was absurd to say that natural selection was how God makes organisms adapt to their environment because natural selection is not a cause. It is a consequence of organisms having different birth rates and death rates. Those organisms in which birth rate exceeds death rate by the greatest amount tend to be the ones that are perpetuated in the struggle for existence. Darwin was at one stage tempted to suppose that God caused the differences in the birth rates and death rates of the variants in a natural population. He promptly rejected that notion as absurd, which it was, for as we know that variation within the species is basically a result of genetic mutation. Mutation is a failure of the gene to reproduce copies of itself exactly. There are many causes of mutation, some of which are known such as radiation. Most of the mutations that occur are deleterious. A small proportion confer beneficial properties on their possessors enabling them to become more successful in the struggle for existence than their progenitors. Mutations are said to be random in the special sense that the particular mutation that occurs at any one time bears no relation to the needs of the organism at that time. Per chance some few may confer benefits. Most do not.

The notion of random variation at the base of the evolution of living organism did not seem to be a particularly conductive framework within which to conceive of God acting in the living world. There was nothing for him to do there. At least that was true of God as Darwin and many of his contemporaries conceived of him. That was not to say that there might be something for another sort of God to do. There was not any room in Darwin's world for a God who pushed matter around. It was difficult, nay impossible, to relate God's action to specific observable events in the real world.

So great was this difficulty that scientific explanation was sufficient reason for many, then as now, to completely reject any notion of God as operative in the universe. I had a sense of history repeating itself when I happened to listen one Sunday morning recently to a BBC radio programme in which a theologian had a discussion with a succession of scientists about God as creator. The theologian argued with an astronomer that the astronomer's concept of the universe starting off with a big bang from an infinitely dense point in space was surely an act of creation. Something has to have set it off. In the beginning God. The astronomer simply replied: 'In the beginning hydrogen'. With Jacques Monod, a Nobel Laureate biologist, the theologian argued that the incredibly complex origin of life from a concatenation of molecules which became more and more complex in an orderly sequence could not have been the product of chance. It indicated a creator who ordered the arrangement with a purpose in mind. Monod agreed that it was indeed complex but what might seem to the theologian to be an orderly directed sequence was in fact the product of something akin to chance variation of arrangements of molecules and natural selection at the molecular level. It was Darwinism pushed down to the molecules. There was no need to invoke God as the Arranger. 'But, said the theologian, 'that is God's method of creation'. 'If that is what God does', replied Monod, 'then I can have no argument except one, it is a moral argument. Such a God must be very wicked'. At no point did theologian and scientist meet in that discussion.

It is meaningless and hopelessly confusing to say that this or that physical or biological event occurs because God makes it happen that way. Whatever God is, he is not an agent of mechanical causation. Monod was correct in inferring that a God who directly

Prof. L. Charles Birch is Professor of Biology and Head of the School of Biological Sciences, University of Sydney, Australia. He is Chairman of the Working Committee of the World Council of Churches' Department on Church and Society.

caused particular mutations (including many with tragic effects) and who supervised natural selection would be a wicked God. There is a second and more subtle philosophical criticism of attributing mechanical causation to God which goes back to Hume and which more recently John Cobb[1] has reminded us of; efficient or mechanical causation refers to observed regularities in a succession of events from which causes are inferred; yet there is no necessity of a causal relationship existing between what is observed.

Whenever we try to atribute this or that particular observable event in the world to mechanical causes initiated by God we run into blind alleys. Science has removed, one would hope for ever, that particular role from whatever roles God may play in the universe. Theologians are very slow to perceive this. If the notion is not explicit in their natural theology then it creeps into their theology of redemption. Theologians could, in general, face up more honestly to the implication of the scientific perspective.

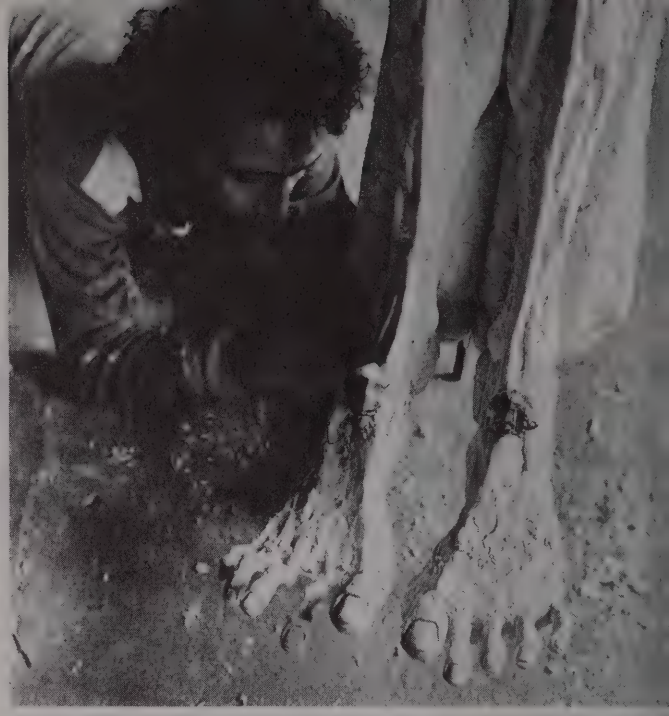
More than any other theology, process theology has attempted to do this. It has been honest with science without at the same time regarding the content of science as a collection of unchangeable and true statements about the universe. Process theology drawn upon science. It also has something to contribute to science. As a biologist, I am little interested in a theology that does not contribute a dimension of understanding to the facts as we know them in biology. Process theology, as I shall indicate later, does this at least for me and some of my colleagues.

Is the Universe Contrivance Period?

Is the universe and all that is in it from electrons to men to be understood in terms of mechanism? This is a question raised by a scientific world view which process thought faces head on. The romantic revolt against science, of which Whitehead wrote so eloquently in *Science and the Modern World,* together with the breackdown of the Newtonian billiard ball universe following Einstein, bespoke another aspect of reality besides mechanism. There is no such thing as a particle. Reality is not things but process. Process involves becoming. Becoming involves something akin to anticipation. The billiard ball analogy gives way to another, that of organism. The universe and all the entities in it are more like lives than mechanisms.

Mechanisms are programmed to be self-driven or driven by the impingement upon them of some other mechanism. Many aspects of the so-called fundamental particles may appear to be like that and some aspects of living organisms too. But not all. Science describes the objective aspects of things, their outer aspects or what David Bohm the physicist calls the explicate order of the world[2]. What science tends to fail to see is that this explicate order is dependent upon what Bohm calls an implicate order, an inner aspect of things. An example in physics is the visual image on the television receiver; points that are near each other in the ordered visual image are not necessarily 'near' each other in the radio wave from which the image is transtated. The radio wave carries the visual image in an implicate order. The function of the receiver is to explicate this order, i.e. to unfold it in the form of a visual image. Generally speaking the laws of physics refer mainly to the explicate order which can be described in precise detail by reference to Cartesian coordinates. Bohm proposes that primary emphasis in physics must now turn to the implicate order. The logic of this is that explicate order is not understood except with reference to implicate order.

I do not think that I am misinterpreting Bohm when I argue that the sort of understanding that physics has given us of electrons and atoms is of their explicate order but that it still leaves hidden the implicate order of which the explicate order is an expression. Furthermore, part of the implicate order of the electron and the atom is the subjective aspects of these entities; what they are in themselves to themselves. Physics does not tell us what it



is like to be an atom or an electron. Many people will say that this is a silly statement anyway. How could you know what it is to be an electron without being one. What electrons and atoms may be to themselves is not necessarily completely closed off from us. As one distinguished physicist said: 'You have to sympathise with atoms to know what they really are'. There are imaginative ways which I shall indicate later. Since Descartes, scientists have lost sight of the implicate order and just think that explicate order is self-sufficient.

Interpreting the Lower in Terms of the Higher

Some insight into the implicate order and subjective aspect of entities comes from considering our own subjective experience our inner private lives which only we know. That is the only starting point for the adventure of understanding of the nature of implicate order. Two elements characterize any human experience it is built upon past experiences and anticipates a future state What I write now is influenced by what I have just written and other past thoughts. That train of thought leads on to novel ideas that extend well beyond my memory of past events. Memory and anticipation are two components of subjective experience. They have causal efficacy in the sense that they are causes of my present action. Future possibilities are causes of now events. This is the meaning of purposive activities. I do not think this is contestable. My next point no doubt is. It is the proposition that there is a realm of possibilities which has a value structure which I can intuitively differentiate, at least in part, as I choose the next step in thought and action. I do not create values. I appropriate them. At a particular moment the relevant values for me are limited by which is appropriate thought and action determined by my experience up to that moment. But with more experience a further field of values opens up before me which may not have been relevant at an earlier stage. The realm of values is not just a pantry from which I choose. To some extent values choose me. On my part there is an eros reaching forward to values not yet realized. Eros is met by the lure of possible values not yet concretely real in my experience. Eros requires agape to give it direction. So too eros is required in order that agape be appropriated by the recipient (Hausman, 1974).[3] Part of the implicate order of the universe is this realm of values which presses on us as possibilities from which we choose and are chosen. It is real. It is influential. It is personal. To be grasped by it is to feel a claim. It is creative. It is an aspect what Christian have, down the ages, meant by the influence

of God in human experience. For this influence there are many metaphors, the light on the hill, the treasure in the field, the good shepherd searching for his sheep. This is the meaning of agape, or in Tillich's terms, of ultimate concern. Within this context God can be conceived of as efficient causation, but in one sense only namely influence. This has been made clear by Cobb.

This conception of the nature of human experience is the window through which we can see something, though dimly, of the nature of implicate order in the rest of existence besides man, be it of cells or molecules or electrons. A proposition of process thought is that the simplest parts of the universe, say the atoms and electrons, are the most primitive cases of that which our own natures illustrate in a vastly complex way. This approach may be justified in a number of ways. I shall indicate two arguments which Hartshorne[4] has elaborated in more detail. Firstly, whereas we know ourselves in two basic ways we know most of nature in but one of these ways: We know ourselves by direct feeling or memory of what it is to be me. We know other things only by things only by sight, sound, smell or touch. We know ourselves by this way also. Since there are two ways of knowing ourselves and not just one then it follows that if any part of the universe can be known in a more complete perspective than any other it is ourselves.

From this the second argument follows, we can see in ourselves in the most unmistakable form characteristics of other creatures which we can see but dimly, e.g. consciousness. Starting at our end of the evolutionary scale we can see some things clearly. We cannot know that the dog has consciousness, but neither can we know that for any other person than ourselves. Knowing it in ourselves and observing the actions of other people and of dogs we can reasonably argue for the existence of consciousness in people and dogs generally. We cannot know what it is to be another person or to be a dog but we can imaginatively have some idea. What is present in lesser degree in the dog compared with ourselves is in even lesser degree in the amoeba and so on down the scale to electrons and the like. At no point can we categorically deny subjectivity, nor of course can we assert it, but to posit that it exists there too in some attenuated form is, for the reasons given, logical and enlightening. It overcomes the impossbile difficulty of trying to account for the evolution of the subjective in man from no subjectivity in what went before man in time. Subjectivity in an electron may be infinitesimally small but 'the difference between zero and a positive value makes all the difference when we are seeking the general principles of reality'.[5] I have elaborated some of these arguments for biology in more detail elsewhere.[6]

Mechanism is an abstraction from organism; to fail to see this is to reify process. In process thought all entities are organisms influencd by past events and anticipate future ones. They are both subjects and objects; subject that experience other entities as objects and are themselves objects experienced by other subjects. Not everything is an entity in this sense. An atom is an entity. It acts as a unit in relation to other entities. A rock is a composite of singular entities but not an entity in itself. A cell is an entity and so is the animal formed of many cells. A tree on the other hand has much less unity than that of an animal and may perhaps best be regarded as a composite.

As entities become organised into larger entities the individuals form ensembles that now act as units. The implicate order of all entities is process which involves 'memory' of immediate past events and anticipation of immediate future events with a degree of freedom in 'choosing' that future out of the realm of possibilities. The degree of freedom of choice of an electron or an atom may be infinitesimally small. Nevertheless, there is for the sodium atom, for example, for future becoming a particular range of possibilities such as combining with another sodium atom or with two chlorine atoms to form metallic sodium, on the one hand, or common salt, on the other. A universe that may have at one time consisted only of hydrogen atoms did not remain for ever that way. All hydrogen atoms did not remain for ever as hydrogen. All actual entities are characterized by permanence and change else there could be no evolution of the cosmos. The electron or atom may be likened to a ball bouncing in a high narrow valley with little freedom to bounce over to neighbouring valleys. Higher level entities are more like balls in gently sloping valleys with a greater freedom to bounce from one valley to another. By analogy with human experience, Whitehead did not hesitate to use the word 'feeling' for the subjective aspect of memory and anticipation, be it in an electron or a mouse. In no way was this to suggest that electrons think or that cells have brains. What it does imply is that all entities are responsive.

The Twofold Nature of God

There is then in this scheme a hidden world of experience in the world of entities. The realm of possibility which anticipation reaches toward is what Whitehead calls the primordial nature of God. It is the aspect of God as the orderer of the world in its inner life without which there could be only chaos and no order. In this view God participates in the world as it evolves and as the possibilities for the world become concretely realized from the organization of electrons and the like into atoms and that of atoms and cells into living organisms. The process of that which is possible becoming concrete is called 'concretion'. It is the creative activity of God in the world as it responds to the divine activity. In his primordial nature, God is not **before** all creation but **with** all creation'.[7] God is both sustainer of existence and lure of existence. What we like to call matter is bits of experience. Without the subjective, nothing could exist. Likewise the world is nothing at an instant. It needs time. The real world cannot be captured in an instantaneous snapshot. It consists of processes continuing through a duration of time.

'Ordered development out of sheer potentials and spontaneity requires that there be love in the cosmos. Without that principle that love is, there would be nothing operative in the origin and development of the universe which could give it specificity and directed order.'[8] Or as Williams has said 'God is joined with his world in the adventure of a real history where both God and the creations have freedom to act and to respond, God supremely and the creature within the limitations of their own creaturely status'.

God is not the sole cause of all happenings. He acts in relation to entities which have their own measure of self-determination. Secondly, accidents can and do happen. They are a source of much disorder. This is an important fact of existence and one that theology finds hard to accept. That God is an ordering agent does not

mean there is no disorder. On the contrary, there is no possibility of evolution without disordering by agencies such as mutation and recombination of genes in sexual reproduction.

The act of participation of God in the world, Whitehead calls the consequent nature of God. In the process the world reacts on God enriching his experience. God participates in the experience of the world. God becomes consicous in his consequent nature.

Such a vision of the world in relation to God is not provable. It stands or falls by its adequacy to account for and illuminate our experience. But it requires imagination to see it. The world is not as tame as our sluggish convention ridden imaginations tend to suppose. This is a view consistent with the scientific description of events. For example, quantum mechanics leads to a reduction of the distinction between matter and mind, life and non-life. Molecular biology likewise blurs the distinction between living and non-living.[9] For many of us this view gives added meaning and understanding to these concepts, which are inexplicable on a purely mechanistic model. For the scientist it is not a case of metaphors or no metaphors. It is a case of which metaphor. And as Schrodinger has said 'No personal God can form part of a world model that has only become accessible at the cost of removing everything personal from it'.[10] For process thought the personal is the model for all entities. It starts with the personal and a process of reduction from the higher to the lower levels of creation. It recognizes divine causation within nature without violating nature's freedom. It is a form of reductionism in which process and mind never disappear. Or as I heard David Bohm the physicist put it, 'Think physics to the end and lose your fear of reduction'. For in this form of reduction explicate order is reduced to implicate order. Reductionism then loses its sting.

In this view the events of cosmic evolution, physical, biological and cultural evolution find a common interpretation. In cultural evolution there is no such thing as religious history as distinct from secular history. All history is the record of events in which possibilities are either made concretely real or are thwarted.

Some events have much more significance than others. This is not because God intervened in these events and not in others. To interpret significant events as special acts of God is to turn God into an agent of mechanical causation. It is to replace persuasive love by fiat acting according to some preordained plan. Significant events are significant because they happen to open up a new realm of possibility heretofore closed. The history of the Jews is rich in such events. The life of Jesus is such an event; it opened up for mankind new possibilities of compassionate understanding, creatively and human brotherhood.

But creation is not something that happened. It is not a doctrine about past events. It is a doctrine of the present. There is in the Galilean origin of Christianity, wrote A.N. Whitehead, '... a suggestion which does not emphasize the ruling Caesar, or the ruthless moralist, or the unmoved mover. It dwells upon the tender elements in the world, which slowly and in quietness operate in love; and find purpose in the present immediately of a kingdom not of this world'.[11]

NOTES

1. John B. Cobb, Jr. "Natural Causality and Divine Action", *Idealistic Studies,* 3 (1973) 207-22.
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ETHICAL CONSIDERATIONS ON THE APPLICATIONS OF BIOLOGY

* *Bentley Glass*

The Greeks combined the myths of Prometheus and Pandora. Prometheus, who pities the sad estate of morals, defied the will of Zeus by stealing fire from the sun in order to bring to man a gift of power from which there blossomed the early technologies of man as toolmaker, traveler, and foodgrower. For this act Prometheus was condemed to immortal torture, and the Gods on Olympus schemed to prevent mankind from fully possessing the fruits of their growing power. Pandory was created, in the fullness of Aphrodite's beauty. Hermes bestowed upon her the power of persuasion, and Apollo gave her music to entice the heart of man. Besides these attributes, she was endowed with burning curiosity, and inevitably pried into the box that was said to contain her dowry. Thence there escaped a thousand plagues to discourage hapless humankind, and only hope was left behind.

Somehow the Greeks had grasped a great truth. For every gift of new knowledge that expands human power and enters the fabric of our civilization, there are offsetting plagues and worries. These are generated by the very gifts of Prometheus, who has come to symbolize in modern life our science and our technology. We would do well to adopt Pandora as equally the fruit of knowledge of nature through science. Every new scientific discovery, every new advance in technology creates longterm effects and side-effects that subtract substantially from whatever immediate benefits accrue. Until we can establish appropriate social institutions for technology assessment, to examine with great care and by scientific means what adverse consequences are likely to flow from particular technological innovations and how those consequences may be circumvented, we will continue to be the children

* Prof. H. Bentley Glass, Past President of the American Association for the Advancement of Science, is Professor of Biology at the State University of New York, Stony Brook, N.Y., U.S.A.

of Pandora. The real tragedy of Prometheus was not his defiance of the gods, nor yet his kindness toward suffering men, but rather his fatal blindness to foresee the full spread of consequences.

The immediate gains from the development of nuclear energy for power must, for example, be balanced against the steady input to the terrestrial environment of tons of high-level radioactive wastes with physical halflives of tens of thousands of years, and against the probability that any recourse to fast breeder reactors that generate more nuclear fuel than they consume will simply enhance the risks of exposure to incredibly toxic plutonium and of hijacking by political extremists who with one atomic bomb in their possession could threaten the world order. The immediate gains in the United Arab Republic from building the Aswan Dam and irrigating thousands of arid acres must be balanced against the spread through the irrigation channels of the snails that carry the dread disease of schistosomiasis, the collapse of the Mediterranean fisheries becauses of the loss of the fertilizing effect of the Nile on the sea, the need for more and more expensive artificial fertilizers for the lands deprived of the fertilizing Nile floods, and the increase in population that has rapidly neutralized every gain in production of food. Many more examples could be cited. These are sufficient to make the point.

Many longterm effects or side-effects can be avoided by a combination of foresight and restraint. The foresight can be supplied by further development of science and its application to the technological problems. The restraint must be governmental, since otherwise the selfish interests of those who benefit immediately from any new technological innovation will rule. But the governmental restraints are not likely to arise unless there is a new spirit among the people, a spirit that demands such deliberate control.

In all such matters a great educational effort must be made to enlighten the people about ultimate consequences. Even that is insufficient. I conclude that only a religious ethic will serve to protect us, the ethic that regards man as the **trustee** of nature for the welfare of all people, now and into the remote future. The Promethean tragedy is neither defiance nor pride. It is in essence the blindness and the greed that make men grasp for immediate rewards.

In molecular biology and genetics the advancing knowledge of the twentieth century has been truly Promethean. Today man can remodel any living species to suit his purposes or to match his whims. The same methods, were they to be applied to mankind itself, can give man control over his own biological evolution. This might take the form of genetic engineering or cloning of selection and implantation of human embryos produced by fertilization of ova in the laboratory; or it might take the tried and true methods of animal breeding involving controlled mating and artificial selection. In either case, and assuming that the geneticist can define the means and prognosticate the result with some accuracy, we are faced with new ethical issues. We pass beyond the obvious benefits of science and beyond even the assessment of certain risks, to enter a nebulous realm of quandaries. The choice of goals involves us in weighing values – even whole systems of values. The scientist cannot make the choice of goals for his people, and neither can he measure and weigh values with accuracy and objectivity. There is nevertheless an important duty he must perform because he and he alone may see clearly enough the nature

The trusteeship of man must not be limited to a concern only for those organisms now living. If our children and our children's children to unnumbered generations are to live in pleasantness upon this Earth, so tiny a planet, so limited in resources, we who live now must develop a deep and abiding concern for the human environment of the future. For human life now depends, and will continue to depend, upon the coexistence of all other species of animals, and especially of the green plants which photosynthesize and the microbes that decompose and recycle the dead. Even the inanimate environment must be preserved much as it is if human life is to persist on earth. Changes that may not be fatal to existence may yet provoke profound, perhaps catastrophic alteration in our psychological adjustment to life.

The alteration of the basic human genotype by genetic manipulation may be beneficial if it relieves humanity of certain horrible diseases and disorders. On the other hand, it might lead to an actual increase in genetic defects if *laissez faire* is the philosophy adopted toward the gene pool. For the continued breeding of persons whose genetic disorders have been mitigated but whose transmitted genes remain unaltered will, to say the least, make more work for medicine and surgery in the future. If, in other words, we eliminate natural selection within the human species we shall eventually pay a price. We must therefore work to purge the gene pool of defective genes, not simply endeavor to modify human phenotypes in chosen direction.
of the alternative choices that lie before mankind. It is therefore the social duty and function of the scientist in this debatable arena to inform as fully as possible, aand to demand of the leaders of the people that there be sufficient consideration of all those impending problems that grow out of the discovery and amplification of human power.

With knowledge, power. With power, responsability. Our scientific knowledge has increased, in this century, by approximately six doublings and is now some sixty-four times as great as in the year 1900. By the end of the century it bids fair to be two hundred and fifty times as great. With the accrued power developing from technology based on this knowledge, we can transform the face of nature. All other species must adjust to our decisions, or die. Many of them, indeed, have already perished because they could not adjust to our depredations that destroyed the habitats to which evolution had adapted them.

As human beings concerned with values, we must quickly recognize that the scales and mutations of values far transcend our own immediate subjective desires. These are limited by our position at one level in the hierarchical scale of biological organization, so what we wilfully subordinate all values at levels below our personal individuality to the values of the individual, gladly sacrificing our cells or organs to the welfare of the body as a whole. We furthermore close our eyes to the values that apply to higher levels of organisation, such as the community and the biosphere. There is indeed grave peril that ere long – maybe in the twenty-first century – the human species will have destroyed our entire delicate biosphere, if not by nuclear war then by callous treatment of the balance of nature. We must learn very soon to endure the thought that human survival itself – and not merely our pleasure or comfort – depends on the preservation of our relations with the rest of life on earth and on the maintenance of the great cycle of the nature that restore the lifegiving properties of our environment.

As I have writen elsewhere: 'We cannot turn the clock back. We cannot regain the Garden of Eden or recapture our lost innocence.From now on we are responsible for the welfare of all living things, and what we do will mold or shatter our own heart's desire.

The ominous specter that threatens mankind in this direction is that of tyrannical imposition of standards of genetic perfection and arbitrary restriction upon human reproduction mandated by the authorities. To avoid the evil path that Nazism chose, reliance upon an informed and enlightened voluntary choice seems the only sensible alternative. Fortunately, as the widening possibilities of prenatal diagnosis and selective abortion have already indicated to us, the sufficient genetic education of the people is not an impossible dream. If two mates who are each carriers of the same recessive genetic disorder refrain from producing more than two children and are willing to use selective abortion to prevent the birth of a gravely defective child, the gene pool of the population

will remain sensibly unaffected. In an already overpopulated world, that seems not too harsh a goal to impose on the freedom to reproduce. In an educated populace, with wide opportunities for genetic counseling, it might well be achieved through voluntary choice. (The same reasoning applies to couples in which one mate carries a definitely harmful dominant gene and the other mate is free of it).

Evolutionary processes adapt a species to its existing, current environment. What the future human environment is to be, we can scarcely imagine at this date. Do we then wish to adapt the human populations of the earth more fittingly to the **present** environment, with all its acknowledged imperfections? Surely not. But then, do we wish to adapt our species more fittingly to the nature of the future environment, which we cannot define? The choice would seem to lie rather in the direction of modifying our present environment in desirable directions, with due deliberation, assessment of all impact upon it of technological innovations, and refusal to take the step that is irreversible. That may be difficult but at least it is the more hopeful way. We do at least have certain knowledge about undesirable aspects of our environment, for the most part those introduced by ourselves. And at least we have a certain vision of a suitable environment in which each child can develop to its fullest physical and mental capacities and live in harmony with man and nature. If all this is so, then we can dismiss as visionary and totally unnecessary those genetic procedures that cannot achieve such goals. In other words, genetic engineering in the sense of improving basic aspects of human genotypes affecting intelligence, cooperativeness, or other fundamental characteristics may be set aside until we have attained a more perfect environment. Human cloning were it ever to prove feasible in spite of the enormous technical difficulties that beset the process, has little or nothing to offer humanity in its quest for healthier, happier people in a beneficent environment.

We may conclude that what is needed by mankind in the present juncture is not a retreat from scientific ways of thinking, but an expansion into the consciousness of everyman of the ways in which science and technology may be directed toward the prevention of Pandora's evils. The trustee is accountable.

COSMOS AND CREATION

** Arthur R. Peacocke*

The activities of cosmologists and theologians have at least this in common: both are assuming that some sense can be made by man of the universe he inhabits or, perhaps more precisely, of that which he constructs from his observations and experiences. To this extent both are assuming that the universe is a "cosmos", i.e. a general world order, a generally ordered entity. (We will not, for the time being, adjudicate between the two possible meanings of « universe » as the « observable universe » and as an absolute whole, if there is in fact such a whole – sometimes described, as « the universe observed » –. The intuition that the universe is ordered, which observation and experience tend to validate, encourages man *qua* cosmologist and *qua* religious thinker to construct models in which that order is made explicit and is given interpretative potentiality.

Chance

For the ancient and classical antinomy of Cosmos was Chaos –

> « Chaos umpire sits,
> And by decision more embroils the fray
> By which he reigns; next him high arbiter
> Chance governs all » [1]

Chaos was the mythical state of affairs which preceded the emergence of the world order, of Cosmos, which was thought to manifest itself in the totality of natural phenomena. Chaos is that which is superseded, indeed defeated by, Cosmos. However, the victory now appears to be a Pyrrhic one, so some would argue. In particular, Jacques Monod[2] has recently made chance, in the sense of the existence of events which are the concurrence of two independent causal chains, into the cornerstone of his understanding of the implications of recent molecular biology – and has thereby once again endowed « chance » with the ability to render man's existence meaningless. It is that abyss (and Chaos was, in one of the myths, a dark and windy chasm) into which many of Darwin's contemporaries peered. It was this daunting vision which induced the anguish which Tennyson had expressed in *In Memoriam* and which provoked the Bertrand Russell of the 1920's to his famous *« That Man is the product of causes which had no prevision of the end they were achieving; that his origin, his growth, his hopes and fears his loves and beliefs, are but the outcome of accidental collocations of atoms; ... all these things, if not quite beyond dispute, are yet so nearly certain that no philosophy which rejects them can hope to stand. Only within the scaffolding of these truths, only on the firm foundation of unyielding despair, can the soul's habitation henceforth be safely built. »*[3]

Today Monod constrasts the « chance » processes which bring about mutuations in the genetic material of an organism and the « necessity » of their consequences in the well-ordered, replicative, interlocking mechanisms which constitute that organism's continuity as a living form. More specifically, mututations in DNA are the results of chemical or physical events and their location in the genome are entirely random with respect to the biological needs of the organism. Those that are incorporated into the genome of the organism (if they are not lethal) are only permanently so incorporated if, in interacting with its environment, the differential reproduction rate of the mutated form is advantageous. So put, it cannot be said to add anything new in principle to the debates of the past 100 years. For the essential crux in these debates was, and is, that the mechanism of variation was causally entirely independent of the processes of selection, so that mutations were regarded as purely random with respect to the selective needs of the organism long before the molecular mechanism of transmission, and alteration, of genetic information was unravelled in the last two decades.

* Rev. Dr. Arthur R. Peacocke, formerly Fellow and Tutor in Biochemistry, St. Peter's College, Oxford, and Chairman of the British Biophysical Society, is Dean of Clare College, University of Cambridge, U.K.

The general conclusion Monod draws is that man, and so all the works of his mind and culture, are the products of pure chance and therefore without any cosmic significance. The universe must be seen not as a cosmos (that is, a directionally ordered whole) but as a giant Monte Carlo saloon in which the dice have happened to fall out in the way which produced man. There is no general purpose in the universe and in the existence of life (and so none in the universe as a whole). It need not, it might not, have existed – nor might man. Therefore any system of philosophy or religion which presupposes any plan or intention in the universe is founded on a fallacy, now fully exposed by the molecular-biological account of DNA and its mutations.

Monod has been strongly criticised by philosophers in his account of much of Western thought and his labelling of it as « animism » (in his special sense: any view which attempts to show that there is any sort of harmony between man and the universe). But the attraction of his book, in addition to its lucid scientific exposition, is that it tries to understand man's significance in the world by starting from the most accurate view of the physical and biological world available to us – namely, that afforded by the natural sciences.

In the past 100 years, the perspective of the sciences concerned with the origin and development of the physical and biological worlds has, or should have, altered our attitude to the natural surroundings which human minds appear to transcend as subjects. For our familiar environment is seen no longer to be a kind of stage for the enactment of the human drama, but rather to share with man common molecular structures and to be steps in a common continuous development in time.

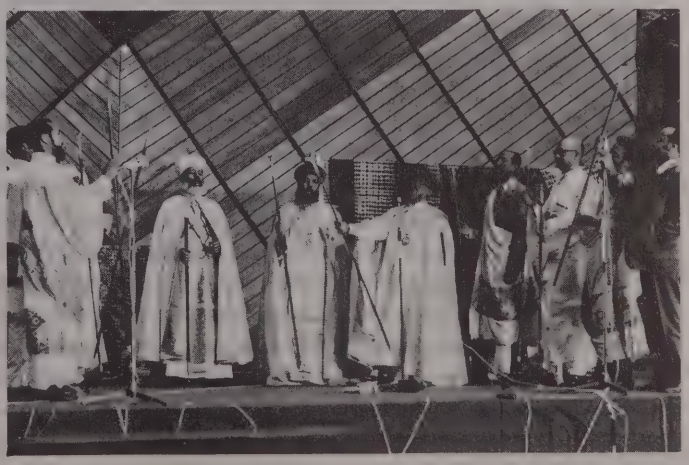
Although this continuity of man with the inorganic world had sometimes been accepted in principle (e.g., *Genesis* 2, « And the Lord God formed man out of the dust of the ground »), it was only in the last century that the scientific evidence for man's relation to other species began to appear. Only in the past few decades could the emergence of primitive living organisms from inorganic matter be outlined in any fashion which had a scientific basis in the new knowledge of biological evolution and of molecular biology and in new insights into the development of the physical cosmos. The broad picture is familiar enough (from atoms to complex molecules and cells and thence to living organisms) but there is one stage in this development which occupies a key position in Monod's thesis, that is the randomness of the molecular events on which natural selection is based.

The whole context of the fundamental idea of natural selection of living organisms has been amplified, since Darwin and Wallace, by our knowledge of the existence of genetic factors, « genes », which are molecular patterns in DNA and are subject to sudden changes (as a result of irradiation or chemical events) that are random with respect to the biological needs of the organisms. It is this which so impresses Monod that he regards all living forms, including man, as the products of « chance ». For the complex and subtle processes of natural selection that favour the survival of particular mutated organisms can only operate among the spectrum of possibilities provided by the random chemical events at the level of DNA.

However, I see no reason why this randomness of molecular event in relation to biological consequence has to be raised to the level almost of a metaphysical principle in interpreting the cosmos. For in the behaviour of matter on a larger scale many regularities, which have been raised to the peerage of « laws », arise from the combined effects of random microscopic events which constitute the macroscopic (e.g., Boyle's law and its dependence on molecular kinetics and all of statistical thermodynamics). It would be more accurate to say that the full gamut of possible forms of living matter could only be explored through the agency of the rapid and frequent randomisation which is possible at the molecular level of the DNA.

This understanding of the role of chance, as the most effective means of exploring all the possibilities innate to matter-energy-space-time, also illuminates, I would urge, an interesting cosmological question. I understand, and I am open to correction on this point, that many cosmologists are taking seriously the possibility that, on the other side from us of the 'hot big bang', when « the universe is squeezed through a knot hole »,[4] all physical constants might be different – even though all such extrapolation is speculative and hazardous. So that the nuclear and electronic energy levels of the atoms of carbon, nitrogen, hydrogen, oxygen and phosphorous on which living matter, as we know it, is so utterly dependent, would be different. Indeed these atoms, or even atoms as such, might not be constituent units of the universe on the 'other' side of the condensed gravitational mass from which our present universe expanded. If this were so, then we have to envisage the possibility that our universe (the one which has allowed the emergence of life, and so of man) is but one amongst a, possibly infinite, cycle of universes and perhaps even of an infinite set of cycles of universes. Our universe then, on this view, just happens to be one in which the physical constants have had values so that living matter, and thus man, could, in time, appear within it – man who could then argue about cosmology and the existence of God! A small change in the physical constants could result in an uninhabitable universe and, if there were various possible sets of values of these constants, then there could be a run of universes of which a number, possibly the great majority, would not produce forms of living and eventually conscious, matter[5].

If we are to take this suggestion seriously, and I believe we must, then we have to extend both the time scale and the ontological range over which 'chance' is thought to operate. It must now be regarded as not only operating to elicit the potentialities of matter-energy-space-time over the spatial and temporal scale of our present universe but also over the ensemble of possible universes in most of which matter-energy-space-time are replaced by new entities consistent with other values of the physical constants and acting, presumably, according to quite different physical laws than those we can ascertain in principle in this universe. Even so, the point is that over the extension of space-time (or whatever replaces it) the potentialities of the ensemble of cosmoses is being run through, 'explored' if you like, and it is this which transforms 'chance' and randomness into creative agents. Or, to put it another way, if we see 'chance' operating in this way, we are no longer daunted by the fact that the existence of life, in general, and of man, in particular, and indeed, of our actual universe, is the result of the operation of chance; we no longer have to apotheosise « chance » as a metaphysical principle destructive of any attribution of significance and meaning to the universe. For however long it may have taken on the time scale of our universe, or however many universes may have preceded (and might follow) it, the fact is that matter-energy has in space-time, in **this** universe, acquired the ability to adopt self-replicating living structures which have in fact acquired self-consciousness and the ability to **know**



that they exist and have even now found ways of discovering how they have come to be.

With reference to our own universe it can be confidently affirmed that the primordial,[6] and still existing, cloud of neutrinos, antineutrinos, helium, nuclei, electrons and protons (particularly the last) has developed in our corner of the universe into living organisms and into man, with all his special qualities, achievements and potentialities for sublimity and degradation. Each transition (for example, the origin of life) within the development of our cosmos can be legitimately regarded as proceeding in accordance with regularities in parallel observations we can make in, or infer from, our present experimental and theoretical investigations of the world we know; that is, briefly, the development of our cosmos has proceeded by natural «law». It is important to stress that the cosmic development presents us with an ordered behaviour of matter which is not abrogated, so it seems to me, by its depending on the random, chance character of the micro-events which underlie the regularities of many kinds of macro-observation.

The cosmic development is apparently a process in which new forms of organisation of matter emerge. The description of terrestrial, biological evolution as displaying «emergence» is often also used to point to the difficulty of fully explaining the mode of being of the newly-appearing form in terms of its immediate, and certainly of its distant predecessors. It is important to realise that it is reasonable to affirm and recognise this emergent character of the cosmic development, as for example Michael Polanyi does,[7] without thereby intending to postulate in any sense any special superadded force or principle *(élan vital,* «entelechy», «life force»), which somehow mysteriously distinguishes living organisms from their non-living components. For the principle applies equally – as Polanyi rightly argues, it seems to me – to the logical (not contingent) impossibility of reducing the principles of operation of, for example, a steam engine to the physics and chemistry of each of its components considered separately. New properties, functions and abilities have genuinely emerged in the successive stages of the development of our cosmos and the laws, principles and categories of thinking and vocabulary needed to describe each stage of this process will be particular to and characteristic of it. In this sense, biology is not «nothing-but» physics and chemistry; nor is human psychology and sociology «nothing-but» biology.

Man

Even allowing for our natural anthropomorphism, there are purely biological criteria (which I have elaborated elsewhere,[8] following G.G. Simpson) whereby man is seen to represent a point of development in which many tendencies have reached a pre-eminently high level. Yet a full description of the «man» who has emerged in the universe goes beyond his purely biological features. One's assessment of the nature of man has a determinative influence at this point and the challenge of the presence of man in the universe as the outcome of evolution evokes various responses among scientists. To some, like Monod, it is a stark fact but in itself not significant for the nature of the cosmos. But to others, such as Eccles, Dobzhansky, Hardy, Hinshelwood and Thorpe (to name a few known to the author) it is a «false modesty, verging on intellectual perversity ... to renounce, in the name of scientific objectivity, our position as the highest form of life on earth and our own advent by a process of evolution as the most important problem of evolution,» as Polanyi[9] affirms.

For to take seriously, as scientists ought, the presence of man as the outcome of the evolution of matter-energy in space-time, in this cosmos, or in the ensemble of cosmoses, is to open up many questions which go far beyond the applicable range of languages, concepts, and modes of investigation developed by the natural sciences for describing and examining the less developed and less complex forms of matter which preceded the emergence of man. For if the stuff of the world, the primeval concourse of protons etc., has a matter of fact and not conjecture become man – man who possesses not only a social life and biological organisation but also an «inner», self-conscious life in relation to others, which makes him creative and personal – then how are we properly to speak of the cosmological development (or the development of the cosmoses) if, after aeons of time, the atoms have become human beings, have evidenced that quality of life we call «personal»?

Moreover, paradoxically and significantly, knowledge of the process by which they have arrived in the world seems to be confined to human beings. We alone reflect on our atomic and simple forbears and we alone adjust our behaviour in the light of this perspective. To ignore the glory, the predicament, and the possibilities of man in assessing the trend and meaning of the cosmic development would be as unscientific as the former pre-Copernican account of the universe, based as it was on the contrary prejudice.

Thus the perspective of science on the world raises acutely certain questions which by their very nature cannot be answered from within the realm of discourse of science alone.

1. What sort of cosmos is it, if the original primeval mass of protons etc., or whatever earlier simpler stage one chooses as one's reference point, has eventually manifested[10] the potentiality of becoming organised in material forms such as ourselves – forms of matter which are conscious and even self-conscious, can reflect and love and hate, and pray, have ideas, can discourse with each other, can exhibit the creative genius of a Mozart or Shakespeare or display the personal qualities of a Socrates or Jesus of Nazareth?
2. How can we explain the existence of such a cosmos of this particular character, outlined above? It seems to me that any explanation (not cause in the cause-effect sequence of our space-time) of the existence of such a cosmos to be plausibly adequate must be one that grounds this existence in a mode of being which is other than the cosmos so described and which transcends mental activity as much as mental activity transcends physical processes. Such a cosmos-explaining-entity must be not less than personal or mental in its nature. Its (?his) existence would make it more comprehensible how matter could possess the potentiality of the mental activity evidenced in man than would the designation of «chance» alone (à la Monod) as a sufficient explanation of the cosmos. The role of randomness in natural processes does not of itself preclude the possibility of the existence of such an entity which, as Aquinas would say, «men call God». So we come explicitly to the question of God and the cosmos and the idea of creation.

Creation

The Christian[11] idea of creation is principally an answer to questions of the sort «why is there anything at all?», «Why is there something rather than nothing?», «Is there a reason for the world's existence?», «Why are things the way they are?» – which overlap and are forms of the earlier two questions (1 and 2) which, it was argued above, are provoked by the intellectual content of the perspective of science on the cosmos and also by the sense of wonder and mystery and open-endedness which that perspective engenders[12]. But it is also evoked by man's awareness of the mystery of personality, of its birth and growth and death, and by the realisation that there is nothing necessary about our existence. We are contingent; we might not **be** at all. Equally man becomes aware of the contingent character of all that surrounds him and extends this sense of contingency to the universe as a whole.

The Christian idea of creation is both a response to such questions and an attempt to satisfy the fundamental human need to focus our sense of mystery and wonder on an Other who beckons as well as dazzling us. The Christian doctrine of God as Creator is, on the one hand, an intellectual and rational attempt to provide

suitable answer to these questions I have delineated and, on the ther hand, it is also an attempt to satisfy deep religious, aesthetic nd mystical needs. These latter aspects can never be eliminated or they have provided the fertile soil of an integrating and cultually creative experience in art, architecture, painting, music and oetry, which has enriched mankind. However, the present conext of this discourse prevents further elaboration of this and we nust concentrate on the more purely intellectual features of the dea, which I now proceed to summarise briefly.

Christians have affirmed, in concord with Hebraic tradition, hat the whole cosmos is other than God, but dependent on him nd that, more metaphysically, the cosmos has contingent and derived being whereas only God has necessary and underived beng, that is, an existence not dependent on any other entity. The classical expression of this belief is to be found in the phrases of he Nicene Creed which attribute creativity to God: God the Father is believed in as 'Maker of heaven and earth, and of all thngs visible and invisible'; God the Son as he 'by whom all things were made'; and God the Holy Spirit as 'the Lord, the giver of Life'. Without going into Trinitarian doctrine at this point it is noable that in this Creed one God is said to be creator, but that each *persona (hupostasis)* of the Triune God – what is so unfortunately translated into English as 'person' – is also explicitly involved with creation.

In its developed form, the Christian doctrine of creation was not an assertion that the world had a beginning at a point in time when God set it all going, but that the cosmos continues to exist at all times by the sustaining creative will of God without which it would simply not be at all. The magnificent passages in the first chapter of *Genesis* are properly regarded by modern Christians not as literal records of what happened but, firstly, and traditionally, as an affirmation that certain features of human life came about as a result of a once-for-all irreversible event; and secondly, and more recently (and perhaps less faithfully to the limited intentions of the Biblical writers) as a way of expressing a present situation, an ever-present truth, by telling a story (what Philip Hefner has earlier in this colloquium called a 'religious myth').

The *Genesis* story is in opposition to the myths, for example, of Babylon,[13] which always postulated something other than God (or the gods) out of which he (or they) shaped the world, and also gave accounts of the birth of the gods themselves. In *Genesis,* and in Christian thinking, the world exists entirely by the **fiat** of God 'And God said, Let there be ...'. In more propositional and less literary terms, *Genesis* is asserting that nothing comes into being but the one God. Thus in the Biblical teaching about creation the prime emphasis is on the dependence on God's will for the existence of everything that is; and, correspondingly, that there was and is nothing whose existence is apart from God. This was later condensed into the assertion that creation was *ex nihilo,* 'out of nothing', which thereby denied pantheism, dualism, Manichaeism and, of course, atheism. This assertion may at first appear to be logically absurd, for only nothing can be made out of nothing, as has frequently been pointed out. But the phrase was intended to emphasise that 'creation' itself is not an act at a point in time but an analogical world representing God's relation to the cosmos now, a relation of absolute dependence of the cosmos on God's will for its very being. MacKinnon[14] quotes William Temple as interpreting this as: God minus the world equals God; whereas the world minus God equals nothing at all. Or we may recall the ascription to God in the Revelation: '... thou didst create all things;

by thy will they were created, and have their being.'[15]

I.T. Ramsey[16] analysed the logical form of 'creation out of nothing' *(creatio ex nihilo)* into two components. The first is the analogical model, 'creation' *(creatio)*, which is a word used of human beings making paintings, symphonies, etc. out of something or by means of something and is here applied to the creation of all that is in the cosmos. The second component is the qualifier, 'out of nothing' *(ex nihilo)*, which has the function of developing a sense of wonder with the universe as its focus and which, by eliciting an awareness of its logical oddity, shows how the word 'God' is being posited in relation to this situation. Ramsey[17] concludes 'whereas creation out of nothing seems, on the face of it, and from its grammar, to be talking of a great occasion in the past, it is rather making a present claim about God, and its logical grammar must be understood appropriately'. He goes on to suggest that perhaps creator out of nothing' *(creator ex nihilo)* might have made the point better, but that then its connection with the empirical world around us, 'creation', would be concealed.

Ramsey referred to 'analogical models' of creation, in the plural, and this reminds us of the rich variety of ways in which has been depicted the constant, but asymmetrical, relation subsisting between God and the world, whereby God maintains the world in being: asymmetrical because all-that-is is contingent and depends on God, who is not contingent and is not dependent on all that which is other than himself. Although the uniqueness and asymmetry of this relation underlies the whole Biblical tradition (e.g., the special Hebrew verb translated as 'create' in Gen. 1:1 is employed only with God as its subject), Christian thinkers have found it necessary to unpack further the content of the idea of creation by means of a variety of analogical models for God and his actions.

A number of complementary and reinforcing models have been necessary to avoid the extremes of a completely transcendent God (which merges into deism) and of a completely immanent God (which merges into pantheism). In deism God has no effective interaction with the world; and in pantheism God tends to be identified with the world – and the Christian idea of creation repudiates both extremes. The models which have been used in the past have been elaborated by contemporary theologians[18] and range from those stressing transcendence and the distance between Creator and creation (such as God as Maker, closely related to God as King and Sovereign) to those stressing the close and intimate relation between Creation and Creator (e.g., the relation of breath to a body, or parts of a living organism to the whole). Some modern authors have furthermore seen relevant analogies in the relation of an artist to his work and the process-theologians have espoused the term "panentheism" to denote a doctrine which attempts to combine transcendence and immanence by asserting that the world is "in" God, but that his being is not exhausted by the world. Biblical images have included the thought of creation as like a garment worn by God; as like the work of a potter; as a kind of emanation of God's life-giving energy, or spirit; as the manifestation of God's Wisdom *(Sophia)* or Word *(Logos)*, which are hypostatized so that they represent the outgoing being and action of God in creation from within his own inner, and ineffable nature. This nature is believed, within Christian thought, to have been partly unveiled in the person of Jesus and thereby to have been revealed essentially as Love, insofar as man can understand God's being at all. Thus creation is regarded as proceeding from the inner life of God as Love and his creating and sustaining beings other than himself as in accord with that more-than-personal inner life.

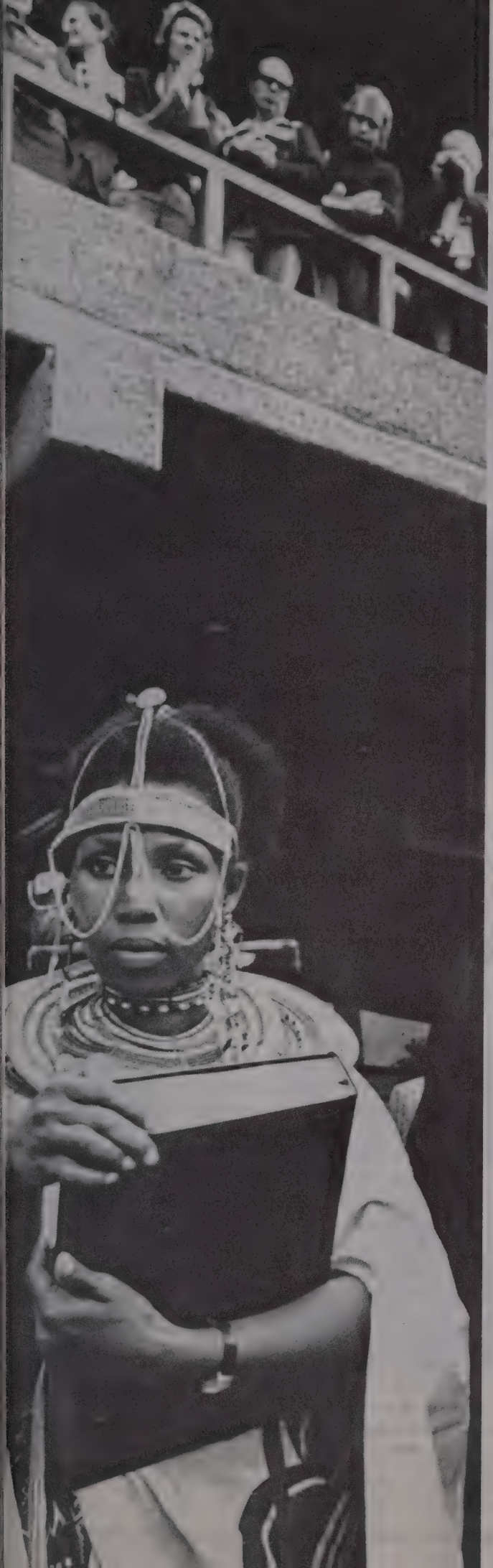
The variety of models of creation which Christian thought has employed testifies to the ineffability of its theme. I hope enough has been said to illustrate that the struggles of cosmologists have long been paralleled by those of Christian theologians. They share the same grandeur and scope in their themes, similar logical pitfalls in their schemata – and similar opprobrium from their excessively empirically minded and pragmatic colleagues!

ing before he made heaven and earth?' or 'How did it occur to God to create something, when he had never created anything before?'], O Lord, to think well what they say and to recognise that 'never' has not meaning when there is not time. If a man is said never to have made anything, it can only mean that he made nothing at any time. Let them see, then, that there cannot possibly be time without creation... Let them understand that before all time began you are the eternal Creator of all time, and that no time and no created thing is co-eternal with you, even if any created thing is outside time."[22]

This is unmistakably clear in its intent – yet it leads to the philosophical paradoxes of the relation of transcendence and immanence, of an eternal God to a temporal world. This labyrinth I will not enter at this point and will observe only that scientific cosmology in investigating and making theoretical deductions about the remote history of our universe cannot, in principle, be doing anything which can contradict such a concept of creation. From our radio-telescopes and other analyses of the nature of the universe at great distances of space and time we may, or may not, discover if there was a point in space-time when the universe as we can observe it began. Whatever we may eventually be able to infer, if anything, about what may have happened on the other side of the 'hot, big bang', the grounds for affirming that the cosmos (or cosmoses) have derived and contingent being, and that God alone is Being in himself, would be unaffected. The doctrine of creation itself would be unaffected since that concerns the relationship of all the created order, including man, to their Creator.

Nevertheless there is an important feature which the scientific perspective inevitably re-introduces into the idea of creation in its 'classical' form just described. This is the realisation, now made explicit, that the cosmos which is sustained and held in being by God (this sustaining and holding itself constituting 'creation') is a cosmos which has always been in process of producing new emergent forms of matter. It is a world which is still being made and, on the surface of the Earth at least, man has emerged from biological life and his history is still developing. Any static conception of the way in which God sustains and holds the cosmos in being is therefore precluded, for the cosmos is in a dynamic state and, in the corner which man can observe, it has evolved conscious and self-conscious minds, who shape their environment and choose between ends.

That the world was in flux and change, with all its corollaries for the destiny of the individual man, has been reflected upon since the ancient Greeks. But that the matter of the world developed in a particular direction to more complex and ultimately thinking forms was not established knowledge. The people of Israel, and following them, the Christian Church, have always believed in the providential hand of God, in human history, with the non-human world being regarded simply as the stage for that drama. Science now sees man as part of 'nature' and both together as subject to continuous development. Any static conception of the relation of God and the world is therefore excluded for if the emergence of new forms of matter in the world is in some way an activity of God, then it must be regarded as his perennial activity and not something already completed. Clearly if God is 'outside time in some sense, that is, if time itself is other than God and part of the created cosmos, there is no more difficulty in regarding God as having a creative relationship with the cosmos at all times than postulating a special creative relation only at some posited 'zero' time. Indeed there is less difficulty, for why should God have a relation to one point in time which is different from his relation to any other point if he himself is not 'in time' at all, that is, if his mode of being is not within the temporal process? There is, of course, a conceptual impasse, as I have already mentioned, in try



Time

Theological models of the relation of God and the world and the cosmological models of modern astrophysics for the most part use entirely different resources for their construction. Nevertheless each has to face the problem of how **time** is incorporated into its models and I shall now turn to an examination of certain aspects of the understanding of time in the theological models. The principal stress in the Christian doctrine of creation, as hinted above, is on the dependence and contingence of all entities, and events, other than God himself: it is about a perennial relationship and not about the beginning of the Earth, or the whole universe at a point in time. The phrase "the whole universe" is notoriously ambiguous since it seems to imply a boundary or limit "beyond" or outside which, in some sense, God exists – and this will not do at all for God would then be in a "beyond" or "outside" which would be but an extension of the same framework of reference as that in which the "whole universe" is conceived to exist. To avoid this conceptual impasse, the doctrine of creation takes the form of an affirmation that any particular event or entity would not happen or would not be at all were it not for the sustaining creative will and activity of God.

The *locus classicus* of this Christian understanding of creation is, of course, the eleventh chapter of St. Augustine's *Confessions* when he addresses himself to those who ask "What was God doing before he made heaven and earth?" and who points out the paradox "If he was at rest," they say, "and doing nothing, why did he not continue to do nothing for ever more, just as he had always done in the past? If the will to create something which he had never created before was new in him... how can we say that his is true eternity, when a new will, which had never been there before, could arise in it?... The will of God, then, is part of his substance. Yet if something began to be in God's substance, something which had not existed beforehand, we could not rightly say that his substance was eternal. But if God's will that there should be a creation was there from all eternity, why is it that what he has created is not also eternal?"[19] This provokes St. Augustine to a profound analysis of our experience of time from which he concludes, in our terms, that the world was created along with and not in time. Time itself is a feature of the created cosmos and therefore no 'act of creation' can be located at a point within created time itself. There is not time without events and God's eternity is not just endless **temporal** duration but a mode of existence which is qualitatively different from the successive temporal experience. So Augustine addresses God thus: "How could those countless ages have elapsed when you, the Creator, in whom all ages have their origin, had not yet created them? What time could there have been that was not created by you? How could time elapse if it never was? You are the Maker of all time. If, then, there was any time before you made heaven and earth, how can anyone say that you were idle? You must have made that time, for time could not elapse before you made it. But if there was not time before heaven and earth were created, how can anyone ask what you were doing 'then'? If there was no time, there was no 'then'."[20]

"It is therefore true to say that when you had not made anything, there was no time, because time itself was of your making. And no time is co-eternal with you, because you never change; whereas, if time never changed, it would not be time."[21]

"Grant them [those who ask the questions 'what was God doing to understand how God the transcendent, the Other, who comes to men from 'beyond' and discloses himself to man, can be related to time at all. But this is only to say that we cannot assert who or what God is in himself. We can only speak of him by analogy. Briefly, the scientific perspective of a cosmos in development introduces a dynamic element into our understanding of God's relation to the cosmos which was previously obscured, although always implicit in the Hebrew conception of a 'living God',

dynamic in action, and in the formulations of (for example) the Nicene Creed.

The Christian convergence of the lines of thought which see God as immanent in the cosmos in general, in man in particular, and as consummated in a particular historical person and in the community expressing his spirit is, I would suggest, peculiarly consonant with the scientific perspective. For in that scientific perspective we see a cosmos in which creativity is ever-present, in which new forms of matter emerge and in which in the end there emerged man, mind, human society, human values – in brief, what people call the 'human spirit'. These two perspectives from, on the one hand, the Hebrew and Christian experience and, on the other, the gamut of the sciences, mutually illuminate each other. Each has its own autonomy and justification but, if both are recognised, a combined insight into the cosmic development is then afforded in which, it seems to me, the features elaborated by the sciences are in harmony with the experiences which cluster around particular events in history and which theological language expounds.

The Christian theological interpretation complements and develops the scientific account in the significance it attributes to these events in human history.

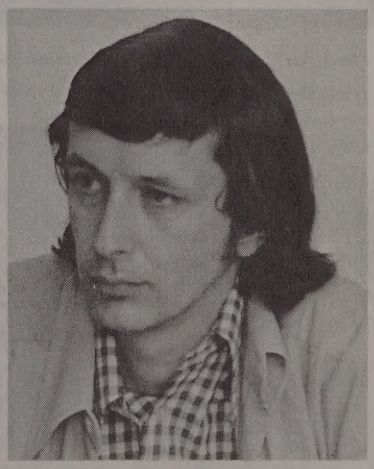
Moreover the theological perspective, if accepted, gives meaning to the present, and a sense of direction for the future to a world still regarded as in process and as the matrix of new emergent forms of human life. The theological perspective itself is correspondingly re-shaped by this consideration of the scientific account of the cosmic development, as I have elaborated elsewhere.[23] The two perspectives are complementary, for the scientific provides the necessary grounding in material reality which the theological requires, and the theological provides the means whereby contemporary man in his community can consciously participate and find both personal and corporate meaning in a cosmic process which, without the Christian perspective, would appear impersonal and even inimical.

However, the contemporary Christian theist in stressing the immanent creativity of God in the cosmos must recognise that it is by the "laws" and through regularities of nature that God must be presumed to be working. This recognition is linked with the important understanding that matter is of such a kind and "laws" which it obeys are of such a kind, that creativity, in the sense of the emergence of new forms of matter, is a permanent potentiality whose actualisation depends on circumstances. This potentiality is not injected into the cosmos from "outside" by God. If God is in the world-process of matter at all, he is in it throughout, in all its potentialities, whether actualised or not; and he continues to hold it in being by his will with these potentialities and not otherwise.

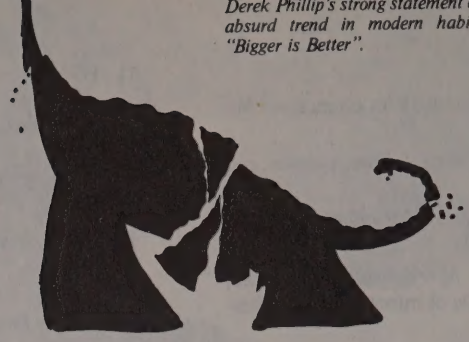
I would not like it to be thought that I have been arguing that the Christian understanding of the cosmos and man's place in it can be **deduced** from the current scientific perspective. But what I am urging is that the Christian understanding of man and the cosmos is, at least, consonant with that scientific perspective. I would go further. It also provides the most meaningful and tested framework in which man's personal consciousness and aspirations can come to terms with his physical and cosmological origins and with his individual finitude.

NOTES

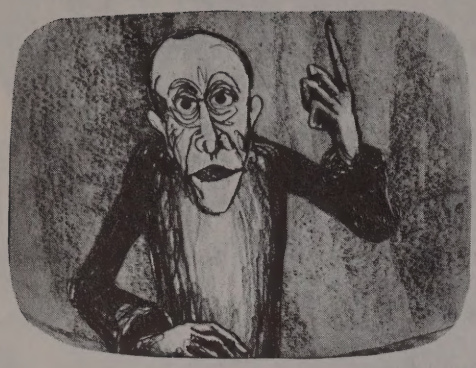
1. Milton, *Paradise Lost,* Bk. ii, 1.907
2. *Le hasard et la nécessité,* Editions du Seuil, Paris, 1970; *Chance and Necessity,* English translation, Collins, 1972
3. *Mysticism and Logic,* and other essays, Edward Arnold, London, pp. 47-8
4. C.W. Misner, K.S. Thorne and J.A. Wheeler, *Gravitation,* chap. 44, W.H. Freeman and Co., San Francisco, 1973
5. I am indebted to a letter published in the *New Scientist,* August 22, 1974, by Mr. I. Watson (in reply to an article of mine) for this suggestion.
6. Existing, according to current views, from 100 seconds after the 'big bang' up to the present and preceded, in the 10^{-2} to 10^{2} seconds after the 'big bang', by photons, electrons, positrons, neutrinos, anti-neutrinos and a trace of protons and neutrons (q.v. A. Webster, *Scientific American,* 1974, **231,** 26).
7. M. Polanyi, *Personal Knowledge,* Routledge and Kegan Paul, London, 1958
8. A.R. Peacocke, *Science and the Christian Experiment,* chapter 3, Oxford University Press, London, 1971
9. *The Tacit Dimension,* Routledge and Kegan Paul, London, 1967
10. Apparently by pure randomness, which is just the surest way of trying out all the possible permutations and combinations.
11. Perhaps, more strictly, the Judeo-Christian idea of creation; but since the main cultural thrust of the idea has, in the West, been mediated by Christian thinkers, I will continue this adjective, with this qualification taken as understood.
12. q.v. H.K. Schilling, *The New Consciousness in Science and Religion,* S.C.M., London, 1973
13. q.v. C.F. von Weizsäcker, *The Relevance of Science,* London, 1964, chapters 2 and 3
14. See the discussion between A. Flew and D.M. MacKinnon in *New Essays in Philosophical Theology,* London, 1955, pp. 172-3
15. Rev. 4:11 (N.E.B.)
16. I.T. Ramsey, *Religious Language,* London, 1957, chapter II
17. *op. cit.,* p. 75
18. E.g. John MacQuarrie, *Principles of Christian Theology,* S.C.M., London, 1966, pp. 200ff.
19. *Confessions,* xi. 10, p. 261 of Penguin Classics edition, translation R.S. Pinecoffin
20. *op. cit.,* para. 13, pp. 262-3
21. *op. cit.,* para. 14, p. 263
22. *op. cit.,* para. 30, p. 279
23. A.R. Peacocke, *op. cit.*



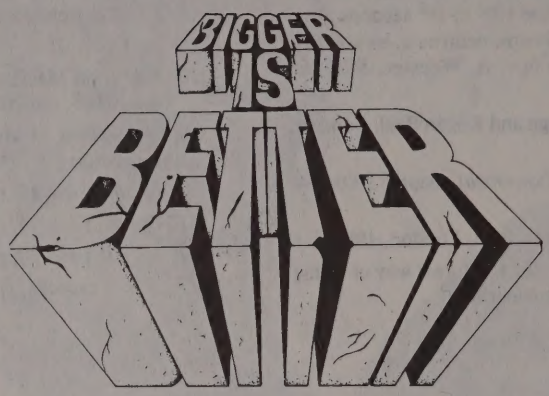
1. Christa Stalschus, administrative assistant on the staff of Church and Society. – 2. Archbishop E.W. Scott, Moderator of the Central Committee of the World Council of Churches and Archbishop Karekin Sarkissian, Vice-Moderator, speak with Dr. Paul Abrecht of the staff of Church and Society. – 3. Dr. John M. Francis, adviser to Church and Society on nuclear power questions.



Derek Phillip's strong statement on the absurd trend in modern habitation "Bigger is Better".

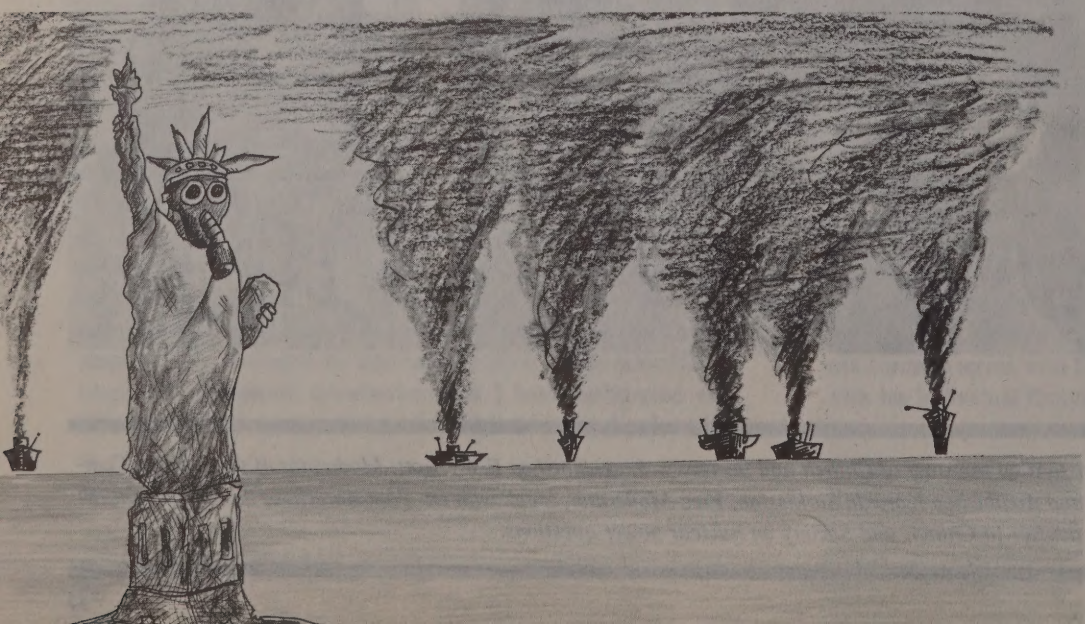


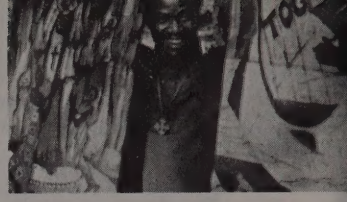
"Preacher" – A WCC production showing the misuse of the media by the church.



"Invitation" directed by Claude Goretta won the Golden Impala for best feature film.

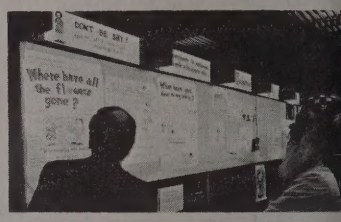
Bruno Bozzetto's comic-tragic "Opera", a satire of the world's social, political and ecological problems.



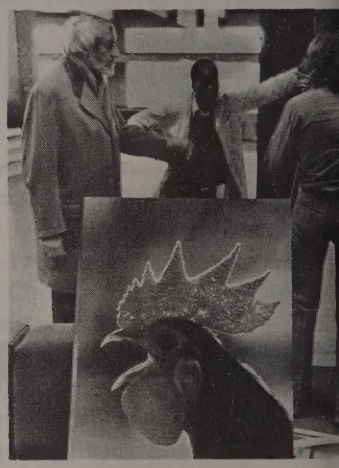


Elimo Njau organized African arts expo, de signed Assembly symbol.

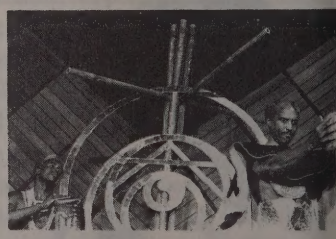
"Children paint for Nairobi".



The Wall Newspaper provided an outlet f frustrations and ideas in word and picture.



A major exhibition examined "The Ten Co mandments Today" by some of the worl greatest photographers.



The African challenge came with a strong pl "Montu" portraying the devastating effects the meeting of cultures.

Filming the WCC production "To be Unit and Free".

CHURCH & FILM

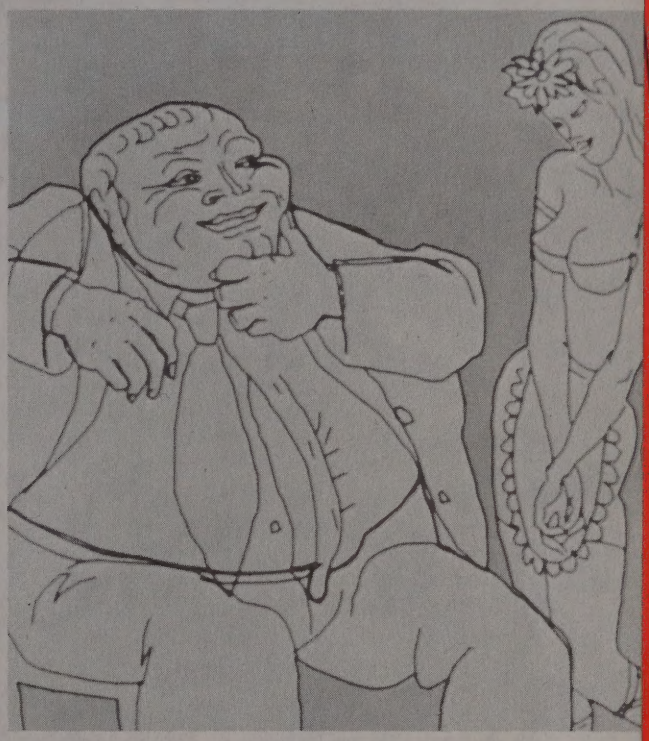
From Poland Krzysztof Zanussi's feature "Illumination" examined the human condition.

Films on social concerns played a big role at Nairobi. Arts, especially film, played a larger part at the Assembly than at any comparable international gathering, church or secular. The emphasis was on communication within the Assembly to stimulate dialogue among the participants. With the help of artists, participants created their own music, dance, and cartoons for the wall newspaper. Exhibitions brought information and stimulation. In all this, film played the major role. Features, documentaries and shorts were presented through the multi-faceted Nairobi International Film Festival and in the "Media Walk" short multiscreen presentations ran continuously interspersed with symbolic non-verbal animation films with a point.

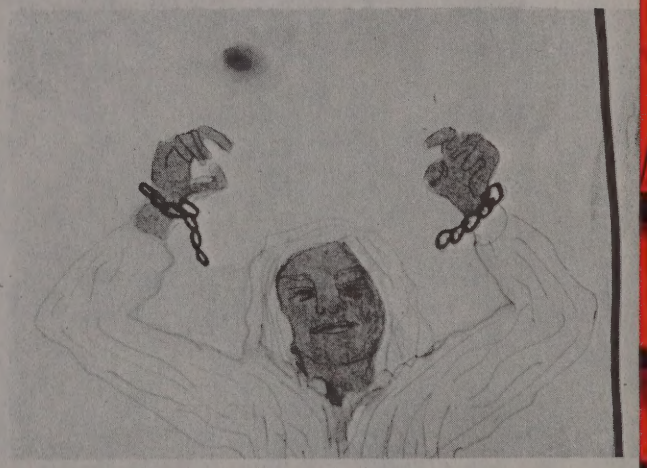
The department on Church and Society had a special presence. IKON, the courageous and creative ecumenical broadcasting organization of the Netherlands made an English version of their film on nuclear power for Nairobi. This colour production takes off from the department's meeting in Sigtuna and then via drama continues the debate on the dangers of nuclear power in the Netherlands. The powerful Polish film "Illumination" dealt with the modern technical world through a young man's search for meaning. Documentary and animated "parables" treated nation building, rapid social change, racism, development, food, ecology, and scores of other concerns.

Following M. M. Thomas' report on the period between the fourth and fifth Assemblies, a film "Uppsala to Nairobi" was shown in plenary highlighting the work for development, the combat against racism, and support for the liberation of the powerless.

The IKON production "Benefit of the Doubt" will be available in English soon for church use from the film department of the World Council. For transmission on TV, contact should be made with IKON.



The prize for best short went to "Hunger" by Peter Foldes for a masterful example of computer-assisted animation.



"Wow" – Women of the World created by Faith Hubley for Nairobi traces the history of women's liberation from repression.

The Honorable Julius Kiano, Kenya's Minister of Commerce opened the Nairobi International Film Week – a central part of the Festival. In 1959, before Kenya became independent, Mr. Kiano gave a major address on the "struggle for African Independence" to the WCC's World Conference on Rapid Social Change, Thessalonica, Greece.

Other speakers were Dr. Takeda Cho, a WCC president from Japan and John Taylor, the World Council's director of film, who conceived the Festival.

"Boat", a 30-second voyage of the ecumenical ship.